FIGURES

Proje	ect De	LOG OF BORING N scription: Big Branch Slurry Impoundment Inve			<u>4</u>		3		Λ		
Depth, feet	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 10 - 15		fragements, damp, loose to medium dense - more clayey (25.0' - 26.5') - SPOIL/FILL -	Ar W	ae fir	7-4-3 3-5-9	t a d	anth	of			
Date E	eer/Geo	tarted: 12/1/00 approximately 35 ft. completed: 12/2/00	lurin	g dril	ling opera	ation	s. Coi	ntiņue	ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORING Nurry Impoundment Inv , Kentucky			<u> </u>	L	7		4	\ [
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	:	Recovery %	ROD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	o	Brown <u>CLAYEY SAND</u> with fragments, damp to wet, loo - w/few coal fragments (30.0)	se to medium dense			5-6-15						
- 35 -	X		- wet @ 35 ft., w/some sub-and shale fragments (35.0'				5-5-6						
- 40 - - 45 - 	X		- numerous sandstone fragn traces	nents and some root			10-12-9						
 - 50 - 	X						2-3-3						
-55- 	X	· · · · · · · · · · · · · · · · · · ·	- brown sand lens (55.0' - 55				10-9-7						
iPJ <i>2/27/</i> 01		a	- gray sandstone boulder (57										
Date Date	e Bor e Bor	/Geolo	nrted: 12/1/00 mpleted: 12/2/00	Remarks: Groundwa approximately 35 ft.					S.	of ntinue	ed Ne	ext Pa	age

	Pr	ojed	t Des	LOG OF BOR scription: Big Branch Slurry Impound Martin County, Kentucky				9	L	7	}			
	Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553- Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	_			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, loose to medium de	nse			50/2"						
-	- - 65			- SPOIL/FILL -	65.0									
	- -	X		Brown and gray <u>CLAYEY SAND to SANDY</u> <u>CLAY</u> with some sandstone fragments, damp dense to very dense	о,			10-14-19						
	- - 70 -						i.							
-	_	X						19-21-21						
_	- 75 -							11-34-39						
		/ \												
-	- 80 				81.0	50	0	50/1"						
	_		\ \ \ \	Brown <u>SANDSTONE</u> , medium hard, weatherd friable gray, fractured (82.5' - 83.6')	ed, 83.6									
	85 - 			VOID (Partially Filled)										
1 1/0/12/2 (-	-					17	4							
RING C00553.	Date Date Eng	e Boi	r/Geolo	arted: 12/1/00 approximate appleted: 12/2/00	ely 35 ft. o	durin	g dri		ation	s. Cor		ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORIN urry Impoundmer v, Kentucky				۳.		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-			VOID		91.5									
			COAL, broken		92.9									
- -95-			Gray <u>CLAY SHALE</u> , very so sandier and medium hard w	oft to soft, becoming with depth		100	70							
		\leq			96.8									
			Bottom of Test Bor	ing @ 96.8 ft.				,						
												İ		
400-														
-														
105-														
-														
110-														
-														
├														
 														
115-														
	:													
5 -														
1 2/2/														
Date Date Eng	e Bor e Bor	/Geolo	rted: 12/1/00 mpleted: 12/2/00	Remarks: Grour approximately 3				st noted a			of			

				OF BORING N			Liadeng.com		5		Z		1
Pro	jeci	Des	cription: Big Branch Slui Martin County,	rry Impoundment Inve Kentucky	stiga	ation	triaden					\	J
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse <u>COAL REFUSE</u>	4.0									
- 5- (Brown <u>CLAYEY SAND</u> with sa fragments, damp, loose to ver										
-10-				,			4-5-5						
-15			- boulder (17.0' - 18.0')				4-4-4						
- 20 - 2							6-5-6						
- 25	X		- more clayey, with plant root to a specific spe				3-5-5						
10/72/2		a	- boulder (29.5' - 30.5')			i i							
Date Date	Bor Bor neer	/Geolo	oth: 101.9 feet arted: 12/4/00 mpleted: 12/4/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	t a d		of 50			

Pr	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inv Martin County, Kentucky			<u> </u>		7			\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		0 0 0 0	Brown <u>CLAYEY SAND</u> with some sandstone fragments, damp, loose to very dense			29-5-4						
- 35 - 			- boulder (35.0' - 36.0')			50/5"						
 - 40 - 			- boulder (38.5' - 39.2')- very clayey, w/possible slurry laminations (40.0' - 41.5')			7-10-40						
 - 45 -												
		0	- possible slurry laminations (46.0' - 46.5')			21-25-38	1			·		
- 50 - 			- wet, w/possible slurry fines @ 50.0 ft.			16-12-11						
- 55 -			- SPOIL/FILL - 55.0									
	X		Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, wet, very dense			24-12-28			-			
Dat Dat Eng	e Bor e Bor	/Geolo	arted: 12/4/00 drilling operations.	ter wa	as fir	st noted a	t a de		of 50			

Pr	ojec	t Des	LOG OF BORING cription: Big Branch Slurry Impoundment Martin County, Kentucky				<u> </u>		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, wet, very dense				12-25-39						
-65-				25.0			30-50/4"						
			Brown <u>SANDSTONE</u> , medium hard, fine to medium grained, weathered, friable	65.8			00 00/1						
-		//											
- 70 - - -		* //			75	48	50/3"						
					73	40							
 - 75 - 			- gray and brown with occasional carbonaceous laminations (74.1' - 83.4')		100	78							
-80-		\ \ \											
-				-									
-		<u>``</u>		83.4									
85-			VOID										
-			(Partially Filled)										
1 1													
20 - 90 - - 90 - Col	molet	ion De	pth: 101.9 feet Remarks: Ground		26 r wa	23 as fir	st noted a	t a d	epth	of 50	ft. d	urina	
Date Date Date Date Date Date Date Date	te Bo te Bo	ring St ring Co r/Geolo	arted: 12/4/00 drilling operation oppleted: 12/4/00	is.								ext Pa	

Pro	ojec	t Des		OG OF BORII durry Impoundme y, Kentucky				triadeng.com	Ī	7	}	4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawin Surface El.: 1052.4 fe Split Spoon Shelby Tube Rock Core MATERIAL DI	et		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			VOI (Partially		94.4									-
-95- 		$\mathbb{N}\mathbb{N}$	Gray <u>CLAY SHALE</u> , very sandier and medium hard											
100		W > > > > > > > > > > > > > > > > > > >	Gray <u>SANDSTONE</u> with s medium hard to hard, fine		97.5	98	98							
		Ž	Bottom of Test Bo	ring @ 101.9 ft.	101.9									,
105-								•						
110 - 														
 -115 - 														
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/4/00 mpleted: 12/4/00	Remarks: Grou drilling operati		er wa	as fir	st noted a	at a d	epth	of 50	ft. d	uring)

Pr	oject	t Des		OF BORING N ry Impoundment Inve			3		3		1		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing N Surface El.: 1055.6 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC	lo. C00553-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with sal fragments, damp, loose to med			:							
 - 10 -		a					6-6-9						
 - 15 -		a	- trace coal fragments (15.0' - 1	16.5')			5-4-2						
 -20-							3-5-6						
- 25							6-4-4						
	moletic	on Der	-SPOIL/FILL	- Remarks: Groundwat	er wa	as fir	st noted a	nt a d	enth	of 40	.0 ft	durir	าต
Dat Dat Eng	e Bori e Bori	ing Sta ing Co /Geolo	rted: 12/4/00 mpleted: 12/5/00	drilling operations.	GI V V (st noteu e	a u		ntinue			

Pro	oiec	t Des		G OF BORIN				ų		5		A		7
			Martin County					triade						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.6 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown <u>CLAYEY SAND</u> with fragments, damp, loose to r					12-5-15						
 - 35 -			- SPOIL/F	ILL -	35.0									
 	X		Brown <u>CLAYEY SAND to S</u> some sandstone fragments dense					16-24-23						
- 40 -40	X				40.5			17-50/5"						
		<i>`</i> ,'	Brown <u>SANDSTONE</u> , medingrained, weathered, friable	um hard, medium				50/0"						
- 45 - 45			- gray, medium hard to hard	from 43.4 ft.										
 - 50		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- occasional carbonaceous (46.9' - 54.6')	laminations		95	71							
 		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	occasional iron stains ((53	.8' - 55.7')										
- 55 - - 5 -						100	64							
PJ 2/27/01						100	94							
Dat Dat Eng	e Bor e Bor	r/Geolo	arted: 12/4/00 mpleted: 12/5/00	Remarks: Grou drilling operation		er wa	as fir	st noted a	t a d		of 40			

-	-Jec		eription: Big Branch Slurry Impoundment Martin County, Kentucky		-	triadeng.com					<u>\</u>	
		.	Location: See Drawing No. C00553-1			v				%		
e e	ype	Symbol / USCS	Surface El.: 1055.6 feet	8		Penetration Blows / 6 inches	%	\ o	Silt and Clay %	Water Content %	aj t	
Depth, feet	Sample Type	n/	Split Spoon	Recovery %	RQD	trati 6 in	Gravel %	Sand %	👸	ont	Liquid Limit	loofie Lineir
eptl	dmg	oqu	Shelby Tube	00 00 00	~	ene ws/	Gra	Sa	an	Jei O	inbi.	1
	ις.	Syr	Rock Core	122		B B			<u> </u>	Wa	_	-
			MATERIAL DESCRIPTION									
	1	`	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained						:			
		ľ, į							:			
		\times										
		\leq										
-65 –		<i>/</i> /										
. –		$\left \right\rangle /$	- iron-stained horizontal fracture @ 66.0 ft.									
-				99	85							
-		/ /										
_		//	- brown w/some iron-staining (68.9' - 70.1')									
70-		<i>/</i> /	and (70.6' - 71.1')									
		$\left \begin{array}{c} \times \\ \times \end{array} \right $										
-		$^{\prime\prime}$										
_		//										
-		<i>/</i> /										
75-		\times										
_										-		
_		$^{\prime\prime}$		100	95							
		//										
		<i>></i>										
								ļ				
80 -		Ĭ,	- modulus of rupture							:		
-		//	(84.2' - 85.0') - 485 psi (85.4' - 86.0') - 346 psi									
	H	//	(00.4 - 00.0) - 040 psi					į				
_		<i>/</i> _/	unconfined compressive strangth	•								
_		(<u>/</u> , /	unconfined compressive strength(83.9' - 84.2') - 6,100 psi					ł				
85		Ĭ,	(85.0' - 85.4') - 5,464 psi									
65-		$\langle \rangle$										
_		///	- iron-stained @ 87.5 ft.		_							
-		<i>//</i>	·	55 37.6	50							
-			VOID									
_			VOID									
90-					<u> </u>		<u> </u>	<u>L</u>	<u> </u>		L	L
Cor		ion De ring Sta			as fir	st noted	at a d	epth	of 40).U ft.	duri	nç

Pro	ojec	t Des	LOG OF BORI cription: Big Branch Slurry Impoundment Martin County, Kentucky				1		7	} /)
eet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.6 feet Split Spoon		Recovery %		Penetration Blows / 6 inches	%	%	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
Depth, feet	- Se) / c	Shelby Tube		ove	P B	etra / 6 i	Gravel %	Sand %	و ا	Ö	l bi	itic 1
Dep	am	ğ E	Rock Core		Rec	_	Pen	ပြ	Š	i ar	ater	Ęi	Plas
:	0)	જિ	MATERIAL DESCRIPTION				ă			S	Š		
			VOID	91.5									
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained, iron-stained										
 -95-				95.4	70	56							
-			VOID										
		>		97.4									
		\leq	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth										
_		\leq	Sandier and medium hard with depth		76	64							
100-		\leq											
-		\leq											
	H	\geq					-						
		$\langle \rangle$		103.5									
		/	Carry CANIDSTONIE with shale leminations		100	100							
105-		\leq	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained		100	100							
L _		ľ,											
L _		$\angle A$		106.9									
]		Bottom of Test Boring @ 106.9 ft.			3.8							
140													
110-						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							
-													
-						İ							
-													
+ -	-												
115-	-												
-	-												
L -													
L -													
2													
2							<u></u>						
§ Dat	e Bor	ion Dering Sta			er w	as fii	st noted a	at a d	epth	of 40	.0 ft.	duri	ng
Eng		r/Geold											

Proje	ect Des		G OF BORING N urry Impoundment Inve , Kentucky			<u> </u>		7		1	\[
Depth, feet	Symbol / USCS	Location: See Drawing Surface El.: 1054.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 5-		Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with fragments, damp, loose to m										
- 10		- trace coal and organic frag	ments (10.0' - 11.5')			6-5-8						
- 15		- mostly sandstone fragmen	ts (15.0' - 16.5')			14-12-6 4-3-4						
- 25		- SPOIL/FI	LL -			4-5-5						
Date E	oletion Der Boring Sta Boring Co eer/Geolo	arted: 12/6/00 mpleted: 12/6/00				-		Coi	ntinu			age

Pr	ojec	t Des		G OF BORING				3		1	1	A		7
		, ,	Martin County,					triad						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	a	Brown <u>CLAYEY SAND</u> with s fragments, damp, loose to m					13-8-7						
- 35 -			- few wood fragments (35.0'	- 36.5')				6-7-7						
 - 40 - 			- brown and gray w/trace woo (40.0' - 41.5')	od fragments				5-6-6						
		0'	- SPOIL/FII	LL -										
-45 - 	X		Brown <u>CLAYEY SAND to SA</u> some sandstone fragments,	NDY CLAY with	45.0			31-38-42						
	-	- <u> </u>												
- 50 -	\approx	· · ·	1,500		50.3			50/4"						
			Gray <u>SANDSTONE</u> , medium medium grained	n hard to hard,		100	0							
			- coal band (50.3' - 50.7')											
- 55 -			- iron-stained, w/occasional of laminations (50.7' - 51.0')	carbonaceous		99	84							
2/27/01			- iron-stained (53.2' - 53.5') a	and (54.0' - 57.0')										
60-	mplet	ion De	oth: 106.7 feet	Remarks: Water v	was r	note	d at a	depth of	83.9	ft. ur	oon d	rillin	a	
Dat Dat Eng	te Boi te Boi	ing Sta ing Co r/Geolo	arted: 12/6/00 mpleted: 12/6/00	completion.			ut 6	. aspail of	-5.0	-	ntinue			age

P	roje	ct Des	LOC ecription: Big Branch Slu Martin County,					3		7		Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray <u>SANDSTONE,</u> medium medium grained	hard to hard,										
-65			- iron-stained, w/occasional c inclusions (63.4' - 68.0')			-								
			- weathered, w/numerous dia (65.8' - 67.4')	gonal fractures		100	69							
- 70 - 		\ \ \ \ \												
 75														
			- unconfined compressive stre (78.9' - 79.3') - 4,950 psi (83.2' - 83.8') - 3,291 psi	ength		100	100							
- 80 - 80			- modulus of rupture (78.0' - 78.7') - 280 psi (84.0' - 84.5') - 388 psi											
			- vertical fracture w/iron stain (81.7' - 83.2') and (84.5' - 85	.5')	:		2	ļ						
- 85 - 			VOID	- D	85.5	47	21							
		tion De	1	Remarks: Wa t	ter was	note	d at a	depth of	83.9	ft. up	on d	rilling	g	
Eng	e Bo	r/Geolo	mpleted: 12/6/00	completion.	·						ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des	LOG OF BORING cription: Big Branch Slurry Impoundme Martin County, Kentucky				2		3				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		V V	VOID Gray <u>SHALEY SANDSTONE</u>	91.1 91.8									
 - 95 -			VOID (Partially Filled)		12	0							
-		V V		96.2 96.7									
		M	Gray <u>SANDSTONE</u>	/	0	0							
100-			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth		93	89							
		MMW.		103.9	100	100							
105-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine grained	106.7									
			Bottom of Test Boring @ 106.7 ft.										
110- 													
1 15-												-	
120													
Com Date Date Eng	e Bor e Bor	/Geolo	nted: 12/6/00 completion.	r was	note	d at a	depth of	83.9	ft. up	oon d	rillin	g	

Proj	ject Des		G OF BORING N urry Impoundment Inve , Kentucky			7 - 2 triadeng.com	L	7		4	\[
Depth, feet	Sample Type Symbol / USCS	Location: See Drawing Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	i	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 5-		Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with fragments, damp, loose to d										
		- mostly sandstone fragment	ts (15.0' - 16.5')			6-5-7						
- 20		- more clayey (20.0' - 26.5')				4-4-4						
- 25		- root and plant traces (25.0' - wet @ 30.0 ft SPOIL/F				11-8-4						
Date Date Engin	pletion De Boring Sta Boring Co neer/Geold ect No.:	arted: 12/6/00 mpleted: 12/8/00	Remarks: Groundwat drilling operations. The stratification lines report					Cor	of 31			

			LO	G OF BORIN	G N	0. 1	DH1	- 5 ខ្ញុំ I		П			\	
Pr	ojec	t Des	cription: Big Branch Slo Martin County	urry Impoundmen , Kentucky	t Inve	stiga	ation	triadeng.com		4	1/		7 [J
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	i		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	a	Brown <u>CLAYEY SAND</u> with fragments, damp, loose to d					16-13-36						
	-		- boulder (31.5' - 33.0')											ļ !
-35- 	X	a						6-5-25						
		0 .			·								1	
	X		- trace coal fragments (40.0)	- 41.0')				1-11-50/5"						
- 45-	-		- boulder (41.0' - 43.5') - SPOIL/Fl	LL -	45.0									
			Brown SANDY CLAY to CLA some sandstone fragments,					11-50/3"						
- 50-														
	X							17-20-21						
- 55-					55.0			50/3"						
			Brown <u>SANDSTONE</u> , mediugrained, weathered, friable	ım hard, medium				JWS						
00553.GPJ 2/27/01		ion Der		Remarks: Gro un		er wa	as fir	st noted a	t a d	epth	of 31	.5 ft.	durir	ng
Date Eng	te Bor	ring Co r/Geolo	mpleted: 12/8/00	The stratification line							ntinue	ed Ne	ext Pa	age

Pro	oject	t Des	LOG OF BORING I cription: Big Branch Slurry Impoundment Inv Martin County, Kentucky			triadeng.com		7		4	\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable	100	100	50/3"						
			- gray, medium hard to hard from 60.6 ft.									
-65- 		\ \ \ \ \	- diagonal fracture @ 65.2 ft.	99	74							
 		\ \ \ \ \ \ \ \	- vertical fracture (66.6' - 66.9')									
- 70 - 			- occasional carbonaceous inclusions (67.5' - 86.1')									
 -75-		\ \ \ \ \ \ \										
				99	99							
 -80-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- modulus of rupture (82.0' - 82.5') - 249 psi (84.0' - 84.6') - 275 psi									
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- unconfined compressive strength (83.2' - 83.7') - 5,920 psi (84.6' - 85.1') - 4,230 psi									
- 85 - 		\ \ 	- sandy shale band (85.4' - 86.1')									
 			VOID - void sample (87.3' - 90.6') brown sand and gravel	31	30	}						
Dat Dat Eng	te Bo	r/Geolo	arted: 12/6/00 drilling operations. ompleted: 12/8/00	 ater w	as fir	st noted	ata d		of 3'			

Pro	ojec	t Des	LOG OF BORING N scription: Big Branch Slurry Impoundment Inv Martin County, Kentucky			2		4		A		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 -			VOID (Partially Filled)									
			96.4									
		$\mathbb{N}\mathbb{N}$	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth		÷, 494							
 100 -				50	34							
		WWW\	103.6						 			
 			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	100	100							
		\ <u>\</u>	109.3									l
110-		V V	Bottom of Test Boring @ 109.3 ft.									
							:					
- 115 - 												
- 120 - 120												İ
Con Date Date	e Bor e Bor	ion De ring Sta ring Co r/Geolo	arted: 12/6/00 drilling operations.	ter w	as fir	st noted a	t a d	epth	of 31	.5 ft.	durir	ıg

Pro	ojec	t Des		G OF BORING Jurry Impoundment Jr, Kentucky			٠		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawin Surface El.: 1051.4 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		Dep esta	th: 99.8 feet			ıs firs	st noted a	t a de	epth	of 40	.0 ft.	durin	ng
Date Date Date Proje	Bori	ng Cor 'Geolog	npleted: 12/8/00	drining operation	Э.				Con	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORIN Irry Impoundmen Kentucky			<u> </u>		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
35 -			Coarse <u>COAL REFUSE</u>		35.0								
	X		Brown and gray <u>CLAYEY SA</u> fragments, damp, loose to de				8-8-11						
-40- 	X		 wet @ 40.0 ft. shelby tube (40.0' - 42.0') be silty to clayey sand with san 		75			17	46	37			
 - 45 -	X		Silly to clayey Salid with Sali	usione fragments	80								
			- shelby tube (45.0' - 46.0') la fragment with some silty sa					:					
-50- 	X		- mostly sandstone fragments	s (50.0' - 61.5')			8-8-10						
- 55 - 5	X						11-25-24						
 5-60-		· · · · · · · · · · · · · · · · · · ·	- SPOIL/FIL										
Con Date Date Eng	e Bor e Bor	/Geolo	rted: 12/8/00 mpleted: 12/8/00	Remarks: Groun drilling operatio		vas fir	st noted a	t a d				durir ext Pa	

		ioo	· Doo		G OF BORING N			۳.		5		7		•
Ľ	-10	jec:	Des	cription: Big Branch Slu Martin County,			auon	triade			1/			
Denth feet	בפלווי, ופפנ	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-	-	X		Brown and gray <u>CLAYEY SA</u> fragments, damp to wet, loos	ND with sandstone se to medium dense			9-10-11						
- - 6:	5 - 2	X		- trace coal fragments (60.0'	- 61.5')			12-18-14						
- - -7	0-			- SPOIL/FI	LL - 70.0									
	-	X		Brown <u>CLAYEY SAND to SA</u> some sandstone fragments, dense	NDY CLAY with damp, dense to very			19-25-26						
7: 	5 - 2	X					`	24-49-50/6"						
-8 - -	0-	X						35-36-24						:
- -8 -	5	X			00.0			9-15-19-27 20-40-50/3"						
PJ 3/2/01	-		, .	COAL SLURRY	88.3									
RING C00553.	Date Date Engi	Bor Bor	/Geold	arted: 12/8/00 ompleted: 12/8/00	Remarks: Groundwa drilling operations.					Coi			durii	

Pro	ojec	t Des	LOG OF BORING cription: Big Branch Slurry Impoundment Ir Martin County, Kentucky				6 triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %		RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			90		-								
		WWWW	COAL 90 Gray CLAY SHALE, very soft to soft, becoming sandier and medium hard with depth	98	3	45							
-95- 		AMMMMMM &	98	.1	0	42	,						
 -100 -		`	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained 99	.8									
 			Bottom of Test Boring @ 99.8 ft.					The control of the co					
105 - 				ī				1 1 1 1					
110-													
. .													
 115- 													
Date Date Eng	e Boi e Boi	r/Geold	arted: 12/8/00 drilling operations ompleted: 12/8/00		_ was	s fir	st noted a	i at a d	epth	of 40).0 ft.	duri	ng

Pro	oject	: Des	cription: Big Branc	LOG OF BO h Slurry Impound unty, Kentucky				triadeng.com		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drain Surface El.: 1052.1 Split Spoon Shelby Tube Rock Core MATERIAL	=	-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse COAL REFUS	E Remarks: C	Groundwat	er w	as fir	st noted	at a d	epth	of 50).0 ft.	duri	ng
Dai Dai Dai Dai Dai	te Bo te Bo	ring Sta ring Co r/Geolo	arted: 12/8/00 empleted: 12/9/00	drilling op	erations.						ntinu			

Pr	ojec	t Des		G OF BORING N urry Impoundment Inve Kentucky			triadeng.com		7		4	\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 35 - 			Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with fragments, damp, loose to verify the second second second second second second second second second second second second second second second second second second second sec				14-8-5						
			- very clayey (45.0 - 51.5 ft.)			8-7-6						
- 50			- with some plant roots (50.0	O - 51.5 ft.)			4-4-5						
PJ 2/27/01			- wet @ 55.0 ft mostly sandstone fragment				14-24-26						
Dat Dat Eng	te Bor te Bor	r/Geolo	arted: 12/8/00 mpleted: 12/9/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	t a d		of 50			

	Pro	ojec	t Des		G OF BORIN urry Impoundmen , Kentucky				Ÿ		7		4		
	Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	ŧ		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-	_	X		Brown <u>CLAYEY SAND</u> with fragments, damp, loose to v					5-13-11						
-		i		- SPOIL/FI	LL -	65.0									
-	65 — — —	X		Brown <u>CLAYEY SAND to SA</u> some sandstone fragments, dense	ANDY CLAY with damp, dense to very				8-15-16						
- - -	- 70 -	\ /		- boulder @ 73.7 ft.					10.00.07.45						
	1	X							19-22-27-40 1-26-64-50/2	ļ ii					
	- 75 - -														
							21	0							
 	30 — —														
-	1 1						14	0							
-	85-					85.7									
+	1			COAL			94	0							
3PJ 2/27/0	00														
KING C00553.	Date Date Eng	e Bor e Bor	r/Geolo	rted: 12/8/00 mpleted: 12/9/00	Remarks: Groun drilling operatio		er wa	as fir	st noted a	t a de		of 50			

Pr	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve			triadeng.com	Ī	3		1		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 - 			Gray CLAY SHALE, very soft to soft, becoming sandier and medium hard with depth	100	68							
			Gray SANDSTONE with shale laminations, medium hard, fine grained Bottom of Test Boring @ 100.4 ft.									
3ING C00553.GPJ 2/28/01 T COI T COI	e Bo e Bo	r/Geold	arted: 12/8/00 drilling operations.	ter w	as fir	st noted a	at a d	epth	of 50).0 ft.	durii	ng

F	Proje	ect	Desc		G OF BORING urry Impoundment In Kentucky			8 -	Ī	4		4		
				Location: See Drawing	No. C00553-1									
	١,	o l	တ္သ	Surface El.: 1053.2 feet				L sec			8	# %		ي. ا
Denth feet		<u></u>) NSC	Split Spoon		Recovery %	اما	atior incl	%	8	Slay	nten	Liquid Limit	Plastic Limit
f		ble	<u> </u>	Shelby Tube		8	RQD	netra s / 6	Gravel %	Sand %	Pu	ပို	pin	stic
ے ا		Sample 1ype	Symbol / USCS	Rock Core		A &		Penetration Blows / 6 inches	0	0	Silt and Clay %	Water Content %	<u>=</u>	Pa
			S	MATERIAL DES	SCRIPTION			Δ.			"	\$		
-				Coarse COAL REFUSE										
l			\approx	,										
			>>											
-			\approx		5.							i		
	5		<i>∞</i>			4								•
-	-	ŀ	· a	Brown <u>CLAYEY SAND</u> with a fragments, damp, dense to v										
-	4		0 .	magmonto, aamp, aono to t	,									
-														
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			٠.٠											
ē l			a	- SPOIL/FI	LL -									
7 2/2	4		۵											
_3 -3		le*	on Da	oth: 105.1 feet	Remarks: Water wa	s note	d at a	denth o	f 82 n	ft. 10	non r	lrillin	ıa	l
	Date E Date E	Bori Bori		arted: 12/11/00 mpleted: 12/11/00	completion.	J 11016	 a. a	aopiii 0	. 52.0	16. U	yon C	a :	ษ	
	Engino Projec		/Geolo lo.:	C00553						Co	ntinu	ed N	ext P	age

Pr	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve Martin County, Kentucky			<u></u>		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.2 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-40			Brown CLAYEY SAND with sandstone fragments, damp, dense to very dense - SPOIL/FILL - 55.0 Brown CLAYEY SAND to SANDY CLAY with some sandstone fragments, damp, very dense			17-15-23 26-50/1"						
Dat Dat Eng	e Bor e Bor	r/Geolo	arted: 12/11/00 completion.	note	u at a	a uepin ot	o∠.U				g ext Pa	age

	Φ	SS	Location: See Drawing No. C00553-1 Surface El.: 1053.2 feet		9		n Jes			%,	ıt %	ı,	
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay	Water Content %	Liquid Limit	Plastic I imit
epth	ald me	logu	Shelby Tube		(ecov	R	enet ws / (Grav	San	t and	ter C	iquio-	Jactiv
_)	Š	Syr	Rock Core		Œ		8 B			Si	Wa	_	Ц
	ļ		MATERIAL DESCRIPTION										
_	X		Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, very dense				28-26-32						
_													
_													
65 -	*	<u> </u>		65.0			50/2"						
-		\ <u></u>	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, weathered, friable										
_		$\langle \rangle$			92	73							
_		$\langle \rangle $											
70 -		/ /	high angle freehure / 67.0 G7.6 # \			-							
_		//	- high angle fracture (67.0 - 67.6 ft.)										
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- with occasional diagonal fractures (67.6 - 68.7 ft.)										
-		//	- gray (67.6 - 84.2 ft.)										
75-		Ž/	g.a, (01.0 01.2 la)		102	89							
-		<i>`</i> ,,	- modulus of rupture (79.5' - 80.1') - 344 psi										
-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(83.0' - 83.8') - 398 psi										
		//	- unconfined compressive strength										
30 -	П	Ž,	(81.2' - 81.7') - 5,700 psi (82.6' - 83.0') - 4,125 psi										
-		Ň,											
_		×,	- void (84.0 - 84.2 ft.)										
_		×,				¥.							
35-		/ /	- gray shale (84.2 - 85.0 ft.)	85.0									
_			VOID										
_			11										
-			 void sample (85.0' - 91.4') brown sand and gravel 										
-													
90-							depth of		L			<u> </u>	L

			Martin County, Kentucky Location: See Drawing No. C00553-1			triadeng.com					.	
		S	Surface El.: 1053.2 feet			se			8	%		
eet	Гуре	SC		Recovery %		tion	%	%	ilay	tent	Liquid Limit	::::
Depth, feet	Je J	1/10	Split Spoon	over	RQD	etra / 6 i	Gravel %	Sand %	S S	§	je L	1
Dep	Sample Type	Symbol / USCS	Shelby Tube Rock Core	Rec	_	Penetration Blows / 6 inches	Ö	Š	Silt and Clay %	Water Content %	Liq	
	0)	S)	MATERIAL DESCRIPTION			<u>~</u>			S	≶		
			WATERIAL DESCRIPTION	- 100			<u> </u>					L
				100	90							
			VOID									
-			(filled w/sand and gravel)									
-												
95-			9	5.3								
-		\leq	Gray CLAY SHALE, very soft to soft, becoming									
	į	\leq	sandier and medium hard with depth									
		\leq										
		\leq										
-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
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		\langle		100	94		1					
			10	4.3								
05			10	5.1								
05		Ţ	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
-				-'								
_			Bottom of Test Boring @ 105.1 ft.									
_												
_												
10-												
_							ļ					
_												
-				-								
15-												
-	}											
-												
_												
_						:						
^-												L
20 - Cor	nplet	ion De	oth: 105.1 feet Remarks: Water w	as note	d at a	depth of	82.0	ft. u	oon c	Irillin	q	

Pro	ojec	t Des	cription:		G OF BORI urry Impoundme Kentucky				friadeng.com	L	3		4)
Depth, feet	Sample Type	Symbol / USCS	Surface s	on: See Drawing e El.: 1051.1 feet plit Spoon helby Tube ock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		on Degining Sta	oth:	104.8 feet 12/12/00	Remarks: Wat	er was	note	d at a	depth of	29.0	ft. up	oon d	rillin	g	
Date Date Date	e Bor	ing Co /Geolo	mpleted:	12/12/00 12/12/00 JEN/CEM C00553	completion.						Coi	ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des		G OF BORIN urry Impoundme , Kentucky				Friadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
Dat	e Bor e Bor	on Depth in graph of the state	rted: 12/12/00 mpleted: 12/12/00	dium dense to very	55.0	noted	d at a	depth of	29.0					
ි Pro	ject N		C00553	The stratification li							ntinue	ea Ne	ext Pa	age

P	rojec	t Des	cription: Big Branch SI	G OF BORIN				<u> </u>		1	?	A		
			Martin County Location: See Drawing		· · · · ·							٠٥		
l t	ype	Symbol / USCS	Surface El.: 1051.1 fee	t		%		Penetration Blows / 6 inches	8		Silt and Clay %	Water Content %	nit	mit
Depth, feet	le T	J / I	Split Spoon			very	Rab	etrati '6 in	Gravel %	Sand %	Ö	Sonte	Liquid Limit	ic Li
Dep	Sample Type	Jupo	Shelby Tube Rock Core			Recovery %	<u> </u>	Pene ows /	Gra	Sa	lt an	ater (Liqu	Plastic Limit
	"	S	MATERIAL DE	SCRIPTION				B			S	W		_
	X	00	Brown and gray <u>CLAYEY S</u> fragments, damp to wet, me dense					15-11-16-18						-
-	$\left\{ \right\}$		uciise					14-21-18-16						
-65	X	a						16-15-14-15						
-			- boulder @ 66.0 ft.					50/3"						
-	X	a	- mostly brown @ 68 ft., w/t	race coal fragments				37-15-47-24						
-70-	$\langle \cdot \rangle$, ' , 'a												
-	+X	٥٠٠						9-18-14-37						
<u> </u>	$\langle \cdot \rangle$	ρ	- w/trace wood fragments (7	0.0' - 74.0')										
	$\frac{1}{1}$	· a	- SPOIL/Fi				1	0-17-28-50/3	,"					
-	$\frac{1}{7}$	· · · ·			74.0			35-39-46-42						
−75 -	\bigvee	. :: . :: :	Brown CLAYEY SAND to Some sandstone fragments,					55-59-46-42						
							2	4-38-39-50/5	,"					
		- <u> </u>												
<u> </u>	\mathbb{N}							16-27-44-42						ı
-80-	$\langle \rangle$													
ļ	X							31-36-55-54						
<u> </u>	$\langle \rangle$	[:-:: -:::-	- boulder @ 82 ft.											l
ļ	X	-	- boulder @ 02 it.					50-82/6"						
ļ		[-1]												
85	11													i
L.														
L.		-:				10	0							
L.	H	[: <u>-</u> :]										ŀ		
27/01														
06 GPJ 2/		-: -:												
Co Da Da	te Bor te Bor		arted: 12/12/00 mpleted: 12/12/00	Remarks: Water completion.	was	note	d at a	depth of	29.0	ft. up	on d	rilling	9	
En Pro	gineer oject N	r/Geolo lo.:	gist: JEN/CEM C00553							Cor	ntinue	ed Ne	xt Pa	ige

<u> </u>			LO	G OF BORI	NG N	10.	DH	1- 9 🚦 [1		
Pro	ojec	t Des	cription: Big Branch Si Martin County	urry Impoundme , Kentucky	ent Inve	estig	ation	1-9 Itriadeng.com	L	4	1			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.1 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		WWW[: 1: 1: 1: 1:	Brown <u>CLAYEY SAND to S</u> some sandstone fragments dense - trace coal fragments @ 92 Gray <u>CLAY SHALE</u> , very so sandier and medium hard w	, damp to wet, very 2 ft. oft to soft, becoming	92.5	56	0							
- 95 - 						101	91							
		M>>>>>>>	Gray <u>SANDSTONE</u> with shamedium hard to hard, fine to		101.0									
105			Bottom of Test Bori	ng @ 104.8 ft.										
410 - 														
 							-							
Date Date Engi	Bori Bori	/Geolo	rted: 12/12/00 mpleted: 12/12/00	Remarks: Wate completion.	r was ı	noted	d at a	depth of	29.0	ft. up	on d	rilling	9	

Pr	ojec	t Des		G OF BORII urry Impoundme r, Kentucky				triadeng.com		3			\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.1 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		on Dept		ILL -		er wa	ıs firs	st noted a	t a de	•pth	of 50	.O ft.	durin	g
Date Date Date Proj	e Bori	/Geolo	mpleted: 12/13/00	drilling operati	ions.					Con	tinue			

Pro	oject	Des		OF BORING N urry Impoundment Inve Kentucky			<u> </u>		3		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 40			Brown and gray CLAYEY SA fragments, damp, medium defined the second seco	ense to very dense	er w	as fir	29-13-12 6-7-7	t a d	enth	of 50	O ft	duri	200
Cor Dat Dat Eng	e Bor e Bor	/Geolo	arted: 12/13/00 mpleted: 12/13/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	t a d				duri i ext Pa	

Project De	LOG OF BORING escription: Big Branch Slurry Impoundment I Martin County, Kentucky			3	L	3				
Depth, feet Sample Type Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	Brown and gray <u>CLAYEY SAND</u> with some sandstone fragments, damp to wet, medium dense to dense			18-19-25						
	- SPOIL/FILL -	0								
65	Brown SANDY CLAY to CLAYEY SAND with some sandstone fragments, damp, medium dense to very dense			13-20-31						
70	- - - - -									
				23-36-47-28						
	- <u>-</u> -			18-15-10-11						
75	77	.0		12-17-9-9 20-16-50/4"						
	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable	88	33	50/1"						
-80-	VOID VOID		33							
	- void sample (80.6' - 85.7') brown silty sand with rock fragments	15	o							
- 85 	7.2% gravel 82.6% sand 10.2% silt and clay									
Completion D Date Boring C	tarted: 12/13/00 drilling operations		as fir	st noted a	t a de	epth	of 50	.0 ft.	durir	ng

Pro	ojec	t Des		G OF BORIN urry Impoundme r, Kentucky				3		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.1 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	i .		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		V	SANDSTONE BOULDER VOID		90.3 91.3	37	7							
		>			94.4									
- 95 - 			Gray <u>CLAY SHALE</u> , very so sandier and medium hard w	ft to soft, becoming ith depth	104.9	100	80							
			Gray <u>SANDSTONE</u> with sha medium hard, fine grained	ale laminations,	109.9	100	94							
110 - 115 -			Bottom of Test Borin	ng @ 109.9 ft.	103.3									
Date Date Eng	Bor Bor	/Geolo	nted: 12/13/00 mpleted: 12/13/00	Remarks: Grou drilling operation	ons.			st noted a			of 50	.0 ft.	durir	ng

Pro	ojec	t Des		G OF BORIN rry Impoundmen Kentucky				triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1057.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse <u>COAL REFUSE</u>		0.5									
 - 5-			Brown <u>CLAYEY SAND</u> with s fragments, damp AUGER W/OUT S											
 - 10 - 														
 - 15 - 														
- 20														
		0	Gray <u>SANDSTONE,</u> medium	hard to hard,	26.0									
GPJ 2/28/01		\ \ \ \ \ \ \	medium grained											
Con Date Date Eng	e Bor e Bor	/Geolo	nted: 12/13/00 mpleted: 12/14/00	Remarks: Water completion.	was r	noted	l at a	depth of	86.5				g ext Pa	age

Pro	ojec	t Des	cription: Big Branch Slu	OF BORING N			2		4	}],	A		
Depth, feet	Sample Type	Symbol / USCS	Martin County, Location: See Drawing Surface El.: 1057.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	No. C00553-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray <u>SANDSTONE</u> , medium medium grained - weathered, soft to medium										
-35 - 			- occasional coal laminations	(34.8' - 38.4')	100								
-40-			- occasional shale clasts (35.	5' - 39.0')	100	68						-	
 - 45 -		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
			- iron-stained (48.2' - 51.1')		97	90							
- 50 - 50			- vertical fracture (50.3' - 51.0)')									
 55-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- occasional carbonaceous la (52.1' - 59.1')	minations									
27/01					97	87							
Date Date	Bor Bor	/Geolo	rted: 12/13/00 mpleted: 12/14/00	Remarks: Water was completion.	note	d at a	depth of	86.5		oon d			age

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve Kentucky			<u> </u>		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1057.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray <u>SANDSTONE</u> , mediun medium grained	n hard to hard,									
- 65 			- fractured (66.1' - 66.5')		100	91							
 70 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- occasional carbonaceous la (69.1' - 90.4')	aminations									
 - 75 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	•		100	92							
 - 80 - 													
 _ 85 _		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- iron-stained (83.6' - 86.0')										
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			89	89							
Date Date Eng	e Bor e Bor	/Geolo	rted: 12/13/00 mpleted: 12/14/00	Remarks: Water was completion.	note	d at a	depth of	86.5	-			g ext Pa	age

Pro	ojec	t Des	LOG OF BORII cription: Big Branch Slurry Impoundme Martin County, Kentucky				<u>9</u>		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			VOID	90.4									
			- void sample (92.6' - 96.2') brown silty sand with rock fragments										
 -95- 			1.3% gravel93.3% sand5.4% silt and clayvoid sample (96.1' - 97.1') gray silty sand with rock fragments		0	0							
100-			15.8% gravel 55.0% sand 29.2% silt and clay	100.5									
		\sqrt{N}	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth		100	92							
105-		M/M/		106.3									
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained		100	60							
110-		//		111.0					Ì		1		
			Bottom of Test Boring @ 111.0 ft.										
 -115 - 								·					
Date Date Engi	Bori Bori	/Geolo	inted: 12/13/00 completion.	er was	noted	d at a	depth of	86.5	ft. up	on d	rillin	g	

Р	rojec	t Des		G OF BORIN urry Impoundment , Kentucky				triadeng.com		3		4		
			Location: See Drawing	No. C00553-1										
پ ا	l g	SS	Surface El.: 1056.2 fee	t		%		Penetration Blows / 6 inches			%/	Water Content %	يبا	🛓
Depth, feet	Sample Type	Symbol / USCS	Split Spoon			Recovery %	Q	ratio	Gravel %	Sand %	Silt and Clay %	ntei	Liquid Limit	Plastic Limit
l tg	l gu	log /	Shelby Tube			Š	RQD	aneti 's / 6	rav	Sanc	and	S	pink	astic
ے ا	Sar	l Ř	Rock Core			8		Now See	0		Silt	Vate	Ĕ	풉
			MATERIAL DES	SCRIPTION				ш				>		
	P		Coarse <u>COAL REFUSE</u>		1.0									
	1	a	Brown <u>CLAYEY SAND</u> with fragments, damp	some sandstone										
	4													
- 5 -	4	a	AUGER W/OUT	SAMPLING										
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		a												
-10	4	ρ												
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g Da	mplet ate Bo	ion Del ring Sta ring Co		Remarks:	L									
SORIN Er Pr		r/Geolo								Col	ntinue	ed Ne	ext Pa	age

F	Pro	jec	t Des	cription		G OF BORIN				3		4		A	\	
Depth. feet		Sample Type	Symbol / USCS	Surface Surface	on: See Drawin ce El.: 1056.2 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	g No. C00553-1 et		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-	-		0 0	fragm Browr	n <u>CLAYEY SAND</u> with ents, damp n <u>SANDSTONE</u> , med d, weathered and iro	ium hard, medium	32.0									
-35 -	5- 1		/ /					100	28							
- - - -40)		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		, medium hard to har lens @ 37.8 ft.	d from approx. 37 ft.		100	68							
- - -45 - - - - -50			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		erous carbonaceous " - 54.0')	laminations		100	86							
GPJ 2/27/01			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					98	92							
SING C00553.	om ate ate ngir	Bor Bor	/Geolo	rted: mpleted:	99.4 feet 1/4/01 1/4/01 JEN/JTS C00553	Remarks:							ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve Martin County, Kentucky			-12 I		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.2 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
65		>>>>>>>>>>	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained - iron-stained vertical fracture @ 65.3 ft.									
- 70		>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	 fractured, w/occasional shale clasts (66.6' - 67.6') carbonaceous laminations (68.1' - 69.1') 	100	56							
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- vertical fracture (72.3' - 72.7')	100	96							
- 80 - 85 - 		>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	89.1	93	93							
Dat Dat Eng	e Bo	r/Geolo	arted: 1/4/01 ompleted: 1/4/01					Col	ntinu	ed Ne	ext Pa	age

Pr	ojec	t Des	LOG OF BORI cription: Big Branch Slurry Impoundm Martin County, Kentucky				3		3		7		
			Location: See Drawing No. C00553-1								,.		
#	be	SCS	Surface El.: 1056.2 feet		%		Shes	١.,		× ×	in %	# <u></u>	ŧ
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	Rab	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
ept	dw	loqu	Shelby Tube		600	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	enel ws /	Gray	San	and	o i	iguiç	lasti
	Sa	Syn	Rock Core		ا ه		Blo P			Sit	Wat		4
			MATERIAL DESCRIPTION										
-			VOID										
 - 95 -			 void sample (89.4' - 99.4') brown silty sand with rock fragments, trace coal slurry 39.3% gravel; 35.8% sand; 24.9% silt and cla 	у	13	0							
			- void sample (93.7' - 96.0') - brown silty sand with rock fragments 42.7% gravel; 37.2% sand; 20.1% silt and cla					-					
-			Gray <u>CLAY SHALE</u> , very soft	99.2 99. <i>4</i>	-		<u> </u>						
100-			Bottom of Test Boring @ 99.4 ft.										
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Dat	e Boi		mpleted: 1/4/01										
Pro	jineei ject N		C00553										

Р	rojed	ct Des		G OF BORING urry Impoundment v, Kentucky				triadeng.com	L	3		Δ		
			Location: See Drawing									٠,٥		
#	g.	300	Surface El.: 1054.0 fee	t		%		n Shes			× %	nt %	ıΪŧ	Ħ
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		-	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
eb t	훁	<u> </u> <u> </u>	Shelby Tube			900	RC	enet /s / (3rav	San	and	ŭ	quid	astic
	Sa	Sym	Rock Core			Ϋ́		Blow P.			Silt	Vate	ا ت	ď
			MATERIAL DE	SCRIPTION				_	l.			_		
_		XXXX	Coarse <u>COAL REFUSE</u>		0.0									
-														
	_4	\otimes												
_					5.0									
- 5		٥	Drown OLAVEV CAND : 19	andstore frame										
F		· · · · a · · · · ·	Brown <u>CLAYEY SAND</u> with	sandstone tragments										
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T			CASING ADVANCE W	OUT SAMPLING										
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5		0	- SPOIL/FI	LL -										
12/12	4	0												
- 30		اه ا												
		ion Dep ring Sta		Remarks: Water v	vas n	otec	ı at a	depth of	78.4	tt. up	on d	rilling	3	
ပ္ Da	te Bo	ring Co	mpleted: 1/11/01											
	iginee oject I	r/Geolo No.:	gist: JEN/CEM C00553							Cor	ntinue	d Ne	xt Pa	age

Pr	ojec	t Des		G OF BORING N urry Impoundment Inve Kentucky			3		7		A	\ [
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>CLAYEY SAND</u> with	sandstone fragments				:					
-40-			CASING ADVANCE W/	OUT SAMPLING									
 - 45 - 													
 50 -	1		- SPOIL/FI	LL - 50.0									
 - 55 -			Brown <u>CLAYEY SAND to SA</u> some sandstone fragments	ANDY CLAY with									
GPJ 2/27/01	ł												
Cooperation Cooper	te Boi te Boi	r/Geolo	nrted: 1/10/01 mpleted: 1/11/01	Remarks: Water was completion.			depth of		Cor			g ext Pa	age

Pr	ojec	t Des		OF BORIN rry Impoundmer Kentucky				<u> -</u>		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	}		Brown <u>CLAYEY SAND to SA</u> sandstone fragments	NDY CLAY with	63.0									
-65			Gray <u>SANDSTONE</u> , hard, m	edium grained										
			CASING ADVANCE W/O	OUT SAMPLING										
-70 -		\ \ \ \ \ \ \ \												
- - -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\												
- -80		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \										•		
-	-	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\												
-85 -	- ¶	//	VOID		85.5	0		WOT/1.5' - 4						
2/28/01			- trace sand recovered (85.7 - brown and gray silty sand v trace roots (87.7' - 89.7')			30		94/2'	34	43	24			
Da Da Da Er	omplet ate Bo ate Bo	r/Geol	arted: 1/10/01 ompleted: 1/11/01	Remarks: Wate completion.	r was	note	d at a	depth of	78.4		oon o			ane)

Pro	ojec	t Des		OF BORING Irry Impoundment Ir Kentucky			triadeng.com		7		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		VOID		25		160/2'	29	61	10			
	X		 less clayey, w/ cobble size fragments (89.7' - 91.7') sand, gravel, and cobbles (15		18/2'	47	35	18			
- 95 - - 95 -	X	\nearrow	Gray <u>CLAY SHALE</u> , very so	95			67/2.3'	43	37	20			
			Bottom of Test Bori										
-													
100-													
-													
-													
 105-													
-													
-						:							
110-													
-													
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115-	-												
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3/2/01													
120- Cor Cor		ion De		Remarks: Water wa	as note	d at a	ı depth of	78.4	ft. uլ	oon d	Irillin	g	
Dat	e Bo	ring Co r/Geol	ompleted: 1/11/01	completion.									

Pro	ject	Desc	cription:		nch Slu	G OF BO Irry Impound Kentucky				triadeng.com		3		4)
Depth, feet	Sample Type	Symbol / USCS	Surface Surface Surface	e El.: 105 Split Spoon Shelby Tube Rock Core	2.4 feet	No. C00553- CRIPTION	1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 10			Brown		ND with s	to very dense	5.0			2-6-3 3-3-4						
Date Date Engi	e Bor e Bor	/Geolo	arted: mpleted:	100.5 fee 11/28/00 11/28/00 JEN/CEN C00553		Remarks: G drilling ope	Froundwaterations.	ter w	as fir	st noted	at a d		of 39			

Pr	ojec	t Des	LOG OF BORING Notice in the control of the control			<u> </u>		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	0	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very loose to very dense			3-4-6						
- 35 - 						2-15-9-8 4-4-9-7						
- 40 - 			- wet @ 39.0 ft.		. *	4-7-11-13						
 - 45- 						4-6-6-7						
 - 50 -	X					7-7-9-9 2-5-8-10						
-	X		- SPOIL/FILL -			4-4-12-11 12-30-28-23						
- 55 - - 5 - 			Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			8-24-25-29 15-26-27-37						
- 60 -						16-28-28-28						
Date Date Eng	e Bori e Bori	/Geolo	arted: 11/28/00 drilling operations.	er wa	as fir	st noted a	t a d		of 39 ntinue			

Pro	oject	: Des		G OF BORING rry Impoundment Kentucky				2		3		7	\)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-65-			Brown <u>SANDY CLAY to CLA</u> some sandstone fragments, dense	YEY SAND with damp, dense to very		•		26-26-30-33 11-24-18-31 19-21-23-25 18-18-29-37 16-24-25-38						
-70 - - 75 - 		:F:>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Brown <u>SANDSTONE</u> , mediu grained, weathered, friable - very soft and weathered @	m hard, medium	70.5	95	91	11-60/6"						
- 80 - - 85 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- tool drop (86.5' - 88.0')		88.0	73	26							
Dat	e Bo	ion Del			dwate	er w	as fii	st noted a	t a d	epth	of 39).0 ft.	duri	ng

Pro	ojec:	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve Martin County, Kentucky			<u> </u>		3		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 -			COAL - unconfined compressive strength (91.5' - 91.7') - 1,290 psi - unconfined compressive strength (95.0' - 95.3') - 3,690 psi	<u> </u>								
		$\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{$	96.0 Gray <u>CLAY SHALE</u> , very soft to soft	100	27							
100 - 			Bottom of Test Boring @ 100.5 ft.						:			
- 105 												
 - 												
 - 115- 												
		ion De		er w	as fir	st noted a	ıt a d	epth	of 39).0 ft.	durii	ng
Date Date Eng	e Bor	ing Co /Geolo	ompleted: 11/28/00									

		cky			2-2 modeng.com						
1	Location: See Drawing No. C	0553-1			10				۰		
Symbol / USCS	Surface El.: 1053.4 feet		%		Penetration Blows / 6 inches	,		Silt and Clay %	ant %	ij	1
	Split Spoon		/ery	Rg D	trati 6 in	e (e	Sand %	ဦ	onte	ř	1 1 1 1 1 1 1 1 1
Depth, feet Sample Type ymbol / USC:	Shelby Tube		Recovery %	ř	ene vs /	Gravel %	Sar	and	er C	Liquid Limit]
Syn Sa	Rock Core		œ		P Blo			Silt	Water Content %	7	(
	MATERIAL DESCRIPTI	N									L
	Coarse <u>COAL REFUSE</u>										
		4.0									
-											
5- a	Brown and gray <u>CLAYEY SAND</u> with fragments, damp, loose to medium of										ĺ
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10 - 10 - 10 - 11				Ī	3-4-7						ĺ
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- 0	- SPOIL/FILL -										
-											ĺ
30 Completion De			er wa	as firs	st noted a	t a d	epth	of 35	ft. d	urnig	 }
Date Boring St Date Boring Co	arted: 11/29/00 drilli	g operations.									

Pr	ojec	t Des		G OF BORING urry Impoundment In , Kentucky			3		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1053.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	t	Recovery %	ROD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		0	Brown and gray <u>CLAYEY S</u> , fragments, damp, loose to n				4-9-9						
- 35 - 			- wet, w/mostly sandstone fr	ragments @ 35.0 ft.			8-7-9						
- 40 - 							5-5-9						
- 45 - 							9-8-10						
- 50 -		· · · · · · · · · · · · · · · · · · ·	- SPOIL/FI Brown <u>SANDY CLAY to CL</u> /some sandstone fragments,	50.0	<u>)</u>		13-16-27						
 - 55-			como canacióno nagmente,	danip, dones									
7.27701	X						13-15-26						
Date Date Eng	e Bori e Bori	/Geolo	nrted: 11/29/00 mpleted: 11/30/00	Remarks: Groundw ood drilling operations.	ater wa	as fir	st noted a	t a de		of 35			

Pr	ojec	t Des		G OF BORING urry Impoundment Inv , Kentucky			ų.		7	}			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1053.4 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	g No. C00553-1 t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>SANDY CLAY to CL</u> some sandstone fragments,				28-19-18						
-65 <i>-</i>	X		Brown <u>SANDSTONE,</u> mediu grained	65.5 um hard, medium			16-50/5"						
 - 70 -		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- weathered and iron-stained	76	·								
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- gray, hard from 69.2 ft.										
-75- 					100	100							
- 80 - - 80 -		`/\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
- 85 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
		\ <u>\</u>	- shaley (86.3' - 86.7')	86.7									
127/01			VOID										
33.GPJ 27.	npleti	on Dep	(Partilly Fil	led) Remarks: Groundwa	ter w	as fir	st noted a	t a de	epth	of 35	ft. de	urnia	_
Date Date Eng	e Bor e Bor	ing Sta ing Co /Geolo	nted: 11/29/00 mpleted: 11/30/00	drilling operations.			or notou a			ntinue			

	<u> </u>		Martin Count Location: See Drawin			- T		Triadeng.com			<u> </u>			
Depth, feet	Sample Type	Symbol / USCS	Surface El.: 1053.4 fer Split Spoon Shelby Tube Rock Core MATERIAL DE	et	Recovery %	N financia.	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	
			VOII		49	9 .	40							$\frac{1}{1}$
			(Partially	Filled)										
 95 -														
		\			96.8									
		\mathbb{W}	Gray <u>CLAY SHALE</u> , very s	oft to soft										
1 00 –		\overline{M}		1	00.5									
			Bottom of Test Bo	ring @ 100.5 ft.										
_														
	-													
105-														١
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1 10 –														
-														
1 15∽														
<u> </u>														
1 20 –			100 - 5	T										L
Date Date Eng	e Bor e Bor	/Geolo	arted: 11/29/00 impleted: 11/30/00	Remarks: Ground drilling operation		was	i tirs	t noted a	t a d	eptn	of 35	itt. a	urnıg	J

Pr	ojec	t Des		G OF BORING I urry Impoundment Inv v, Kentucky			Ų	L	7		Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.9 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
5-			Coarse <u>COAL REFUSE</u>	5.0									
 - 10-			Brown <u>CLAYEY SAND</u> with fragments, damp, medium o										
 	X						7-4-5						
		0 0 0 0 0					5-9-14						
							6-50/5"						
	X		- mostly sandstone fragmen	LL -		_	6-4-6						
Com Date Date Eng	e Bori	/Geolog	rted: 11/30/00 mpleted: 11/30/00	Remarks: Water was completion.					Con	on d			ge

	•	နွ	Location: See Drawing No. C00553-1 Surface El.: 1054.9 feet			es			%	%		
feet	Sample Type	Symbol / USCS	Split Spoon	Recovery %		Penetration Blows / 6 inches	%	%	Silt and Clay %	Water Content %	Liquid Limit	timi 1 ottocla
Depth, feet	ble	/ 100	Shelby Tube	, ove	RgD D	netra	Gravel %	Sand %	<u>Б</u>	Con	uid L	1
De	San	ym's	Rock Core	Rec		Per	Ō	S	iit a	ater	Liq	6
		8	MATERIAL DESCRIPTION			ω			0)	8		
_	X		Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense			10-8-12						
-												
5 – –	X		- sandstone boulder @ 35.0 ft.			50/5"						
-												
0 – –	X	0	- mostly sandstone fragments (40.0' - 41.5')			14-18-7						
-		a	ODOU /FILL									
		ο΄. · · · · · · · · · · · · · · · · · · ·	- SPOIL/FILL -									
5-	X	·	Brown SANDY CLAY to CLAYEY SAND with some sandstone fragments, damp, dense			22-22-23						
1 1 1												
0-		7.4.7 7.4.7										
_	\triangle	-:				16-21-22						
1	·											
55 – –	X					17-18-19						
_		: : :]										
_		$\begin{bmatrix} \cdot & \cdot \\ \cdot & \cdot \end{bmatrix}$	59.0									
so –		Ĭ.	Brown SANDSTONE, medium hard						1		i	

Pro	ojec	t Desc		G OF BORING urry Impoundment Inv , Kentucky			3.		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.9 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 65 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Brown <u>SANDSTONE</u> , medit grained				50/1"						
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- diagonal fracture @ 64.6 ft - clay seam @ 65.6 ft.		98	66							
70 <i>-</i>		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- gray, hard, with occasional inclusions from 67.6 ft.	carbonaceous									
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
-75 - - 80 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			100	85							
		>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>									•		
- 85 - 		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		88.4									
Date Date Eng	e Bori e Bori	/Geolog	rted: 11/30/00 mpleted: 11/30/00	Remarks: Water was completion.	note	d at a	depth of	83.9		oon d			age

Pr	ojec	t Des	LOG C cription: Big Branch Slurry Martin County, Ker	OF BORING N mpoundment Inventucky			Ų		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. Surface El.: 1054.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIP		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 -			VOID (Partially Filled)		40	33							
100-		\ \\\\	Gray <u>CLAY SHALE</u> , very soft to so	100.5									
 			Bottom of Test Boring @ 1	υυ.ο π.									
 					The state of the s								
Date Date Engi	Bori Bori	/Geolo	rted: 11/30/00 con mpleted: 11/30/00	arks: Water was r npletion.	otec	l at a	depth of	83.9	ft. up	on d	rilling	3	

Pro	oject	Desc	cription:		urry Impo	BORING Noundment Investor			٧.		7		4		
Depth, feet	Sample Type	Symbol / USCS	Surface Surfac	on: See Drawing e El.: 1049.5 feet plit Spoon helby Tube lock Core MATERIAL DES	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
8 Date	Bori	Dept. on pepting in the property of the proper	th:	120.1 feet 11/30/00 12/1/00	Remarks: drilling	Groundwat operations.	er wa	as firs	st noted a	t a d	epth	of 40	ft. d	uring	
Date Eng Proj		Geolog	mpleted: gist:	12/1/00 JEN/CEM C00553		fication lines renn						ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des		G OF BORING N urry Impoundment Inve y, Kentucky					3		Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1049.5 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 35 - 			Coarse <u>COAL REFUSE</u> - wet @ 33.0 ft., w/some po	ssible slurry									
- 40			Brown <u>CLAYEY SAND</u> with fragments, damp, medium o				8-9-8						
 - 50 - 							7-7-10						
- 555			- SPOIL/FI	LL -			10-7-8						
Date Date Eng	e Bori e Bori	/Geolog	rted: 11/30/00 mpleted: 12/1/00	Remarks: Groundwate drilling operations.	er wa	s firs	st noted a	t a de		of 40			

		LO	G OF BORING N	10.	DH	2-4 § I				-		
Pro	ject [Description: Big Branch Slu Martin County	urry Impoundment Inve , Kentucky	estiga	ation	triadeng.com	L		1/			J
Depth, feet	Sample Type	Location: See Drawing Surface El.: 1049.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 		. · a				4-10-4						
-65-		- mostly sandstone fragmen (60.0' - 71.5')	ts with some clay			13-15-16						
70		·	s (65.0' - 66.5')									
		· · · · · · · · · · · · · · · · · · ·				10-13-9						
-75 / 		- very salidy (75.0 - 76.5)				25-20-33						
-80-		- filter cake (80.0' - 81.5')				5-7-8						
85		- SPOIL/FI	LL - 85.0									
		Brown SANDY CLAY to CLA some sandstone fragments, dense				27-29-38						
Date Date Engir	Boring Boring	Depth: 120.1 feet Started: 11/30/00 Completed: 12/1/00 eologist: JEN/CEM C00553	Remarks: Groundwate drilling operations.	er wa	as fir	st noted a	t a de		of 40			

Pro	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve			<u>4</u>		3		Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1049.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	\times		Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			53-62/6" 24-29-29-29						
 - 95 -	X					14-25-20-25						
	X					23-36-33						
100-	**		100.0 Brown <u>SHALE</u> , soft, weathered			50/2"						
		/	Gray SANDSTONE with shale laminations, medium hard, fine to medium grained									
105-			- iron-stained to 102.1 ft.	93	71							
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- vertical fracture @ 103.6 ft. and 108.5 ft.									
- - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				·						
415-) // //	- coal/shale band (116.0' - 116.5')	100	75							
2/28/01 		\mathbb{N}	COAL 118.2 Gray CLAY SHALE, soft									
Date Date Eng Proj	Bor Bor ineer ect N	/Geolo	oth: 120.1 feet rated: 11/30/00 rmpleted: 12/1/00 Remarks: Groundwat drilling operations.					Cor	of 40			

Pro	ojec	t Des	cription: Big Bran Martin C	LOG OF BOR ch Slurry Impoundm ounty, Kentucky				3		3		4)
				awing No. C00553-1	už (, <u>,</u>			_	9		
ᇥ	,be	ဒင္သင္	Surface El.: 1049	.5 feet		%		E G			% 	ant 9	ŧ	nit
, fe	е Ту	ŝ) /	Split Spoon			/ery	RQD	ratic 6 in	<u>@</u>	% 0	Sa Ca	onte	트	٠Lir
Depth, feet	Sample Type	Symbol / USCS	Shelby Tube			Recovery %	쬬	enel	Gravel %	Sand %	Silt and Clay %	er C	Liquid Limit	Plastic Limit
	Sa	Sym	Rock Core			ď		Penetration Blows / 6 inches			Silt	Water Content %	ב	₫.
			MATERI	AL DESCRIPTION										
			Bottom of Te	st Boring @ 120.1 ft.	120.1	-								
													1	
L													ł	
125-														
F -														
-														
L -														
130-														
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20.														
පි Dat	e Bor	on De ing Sta		Remarks: Gro		er wa	as fir	st noted a	at a d	epth	of 40	ft. d	uring	
Eng Pro		/Geol												

Pro	oject	Des	cription:	Big Bra Martin (nch Slu		oundm				triadeng.com	L	4)
Depth, feet	Sample Type	Symbol / USCS	Surface Surfac	on: See D e El.: 105 plit Spoon thelby Tube cock Core	1.2 feet				Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse	e COAL REF													
GPJ <i>2/27/</i> 01	1							30.0									
Congue Co	e Bori e Bori	Geolo/	rted: npleted:	110.0 feet 12/1/00 12/2/00 JEN/CEM C00553		Remarks drilling			er wa	as fir	st noted	at a d		of 45			

Pr	ojec	t Des	LOG OF BORIS cription: Big Branch Slurry Impoundment Martin County, Kentucky			2		7	}			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very loose to medium dense			3-2-2						
- 35 - 						5-8-12						
 40 - 			- trace coal fragments @ 40.0 ft.			8-11-19						
- 45 - 			- wet @ 45 ft., w/mostly sandstone fragments			10-8-16						
 - 50 - 			- gray sandstone fragments (50.0' - 51.5')			6-5-7						
- 55 - 			- mostly sand w/some sandstone fragments (55.0' - 56.5')			7-8-13						
Dat Dat Eng	e Bor e Bor	/Geolo	nted: 12/1/00 drilling operation of the drilling operation operation of the drilling operation of the drilling operation operation operation operati	ndwater w ons.	as fir	st noted a	ıt a d				uring	

LOG OF BORING NO. DH2-5 Project Description: **Big Branch Slurry Impoundment Investigation** Martin County, Kentucky Location: See Drawing No. C00553-1 Water Content % Symbol / USCS Penetration Blows / 6 inches Surface El.: 1051.2 feet Plastic Limit Sample Type Recovery % Liquid Limit Depth, feet Silt and Clay Gravel % Sand % Split Spoon RQD Shelby Tube Rock Core **MATERIAL DESCRIPTION** 12-6-7 Brown and gray **CLAYEY SAND** with sandstone fragments, damp to wet, very loose to medium dense - mostly gravel-size sandstone fragments (60.0' - 61.5') 65 10-15-13 5-6-9 - SPOIL/FILL -76.0 10-16-24 Brown SANDY CLAY to CLAYEY SAND with some sandstone fragments, damp, very dense 22-27-28 85 20-50/5" BORING C00553.GPJ Remarks: Groundwater was first noted at a depth of 45 ft. during Completion Depth: 110.0 feet 12/1/00 Date Boring Started: drilling operations. Date Boring Completed: 12/2/00 JEN/CEM C00553 Engineer/Geologist: Continued Next Page Project No.:

	-,		Martin Coun	Slurry Impoundme ty, Kentucky		1	T	2-5 mol						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawi Surface El.: 1051.2 fe Split Spoon Shelby Tube Rock Core MATERIAL D	~ ,		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	
	X		Brown <u>SANDY CLAY to C</u> some sandstone fragmen					16-24-30						
	X		- very clayey @ 92.5 ft., w	//some coal fragments				20-26-27						
- 95 		1: /////	Gray <u>CLAY SHALE,</u> very	soft to soft	95.0			50/1"						
00-						84	39							
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Curu CANDOTONIC with a	hala lancin ati	102.1									
105-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with s medium hard, fine to med			98								
		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				90	90	1		i L				
10		<i>`</i>	Bottom of Test Bo	ring @ 110.0 ft.	110.0									
115 -														
120				—										
Com Date Date	Bori Bori ineer	/Geolog	rted: 12/1/00 mpleted: 12/2/00	Remarks: Ground drilling operation		er wa	s firs	t noted at	t a de	epth (of 45	ft. du	ıring	

Pro	ojec	t Des	cription		G OF BO urry Impour , Kentucky				triadeng.com	L	7	}	4		
Depth, feet	Sample Type	Symbol / USCS	Surface Surfac	on: See Drawing ce El.: 1052.0 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t	3-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
වූ Date	Bori	on Depping Sta	th:	105.2 feet 12/2/00	Remarks: 0	30.0 Goundwate erations.	r was	s first	t noted at	a de	pth o	f 50 1	ft. du	ring	
Date Proj	Bori	ng Cor 'Geolog	npleted:	12/4/00 JEN/CEM C00553	The stratifica							ntinue	ed Ne	xt Pa	ige

		S	Location: See Drawing No. C00553-1			Sg.			%	%		
feet	Sample Type	Symbol / USCS	Surface El.: 1052.0 feet Split Spoon	% ^		Penetration Blows / 6 inches	%	8	lay %	Water Content %	imit	<u>.</u>
Depth, feet	nple	/ loq	Shelby Tube	Recovery %	Rab	netra s / 6	Gravel %	Sand %	Silt and Clay	ပ်	Liquid Limit	Disetic Limit
മ്	Sar	Sym	Rock Core	8		Pe	ဗ	"	Silt	Vate	Lis	6
			MATERIAL DESCRIPTION							_		L
1 1	X	0	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense			6-5-7						
-		a				;						
- 35 -		a										
	X	a				5-7-8						
		a										
-		a										
10-	$ egthinspace{1.5em} otag$	a	- very sandy, with numerous gray sandstone			20-15-13						
1	\triangle	a	fragments (45.0' - 46.5')			20-13-13						
4		a		-				ı				
- 15 -		. ° . · a								,		
13 – –	X	a				4-3-18		1				
-		a									ļ	
-												
		D						at.				
_	X	a	- wet @ 50.0 ft.			11-8-8						
-		a					-					
-		٥٠٠٠										
_		ρ										
55		. α	- brown and gray, very sandy, w/some coal							}		
-	Δ	, ° , · , a	fragments (55.0' - 56.5')			7-7-10						
-		0'.'										
			- SPOIL/FILL -									
-		a							1			

Pr	ojec	t Des		G OF BORING irry Impoundment I Kentucky			3		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	α αα	Brown and gray <u>CLAYEY SA</u> fragments, damp, medium d				5-7-6						
- 65			- w/small wood fragments @	60 ft.									
	X		- SPOIL/FII	.L -			11-11-19						
 -70-	X	· · · · · · · · · · · · · · · · · · ·	Brown SANDY CLAY to CLA	YEY SAND with	0.0		17-25-31						
			some sandstone fragments, dense	gamp, dense to very									
- 75 - 	X		w/gray mottling from 75 ft.				17-25-31						
- 80 -													
- 80 -	X						21-32-31						
 - 85 -						:	40.00.40						
							13-23-18						
06 – 80 – 2077		. :: . :: :			0.0								
Cor Dat Dat	e Bor e Bor		arted: 12/2/00 mpleted: 12/4/00	Remarks: Goundy drilling operations		s firs	t noted at	a de	pth c	of 50	ft. du	ıring	
Eng Pro	jineer ject N	/Geolo lo.:	ogist: JEN/CEM C00553						Cor	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des		OG OF BORII lurry Impoundme y, Kentucky				ų		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawin Surface El.: 1052.0 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	et .		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		COAL					22-27-37						
	X				93.5		,	15-18-37						
- 95 - - 9 - 			Gray <u>CLAY SHALE,</u> very s	oft to soft				50/2"						
100-					100.7	100	90							
		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with sh medium hard to hard, fine t		105.2									
105-			Bottom of Test Bor	ing @ 105.2 ft.	105.2									
 - 110-														
 -115-			en en en en en en en en en en en en en e											
1 1 1					.·									
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/2/00 mpleted: 12/4/00	Remarks: Goun drilling operation		er wa	s firs	t noted at	a de	pth c	of 50	ft. du	ring	

Р	rojec	t Des		G OF BORING rry Impoundment Kentucky				2-7 mol		7		4		
			Location: See Drawing	No. C00553-1					_					
	0	၂ တ္က ၂	Surface El.: 1051.7 feet		į	.0		les Jes			%	t %	L.	
Depth, feet	Ιğ	SS	Split Spoon		Ì	Recovery %		inch	Gravel %	8	Slay	ıten	Liquid Limit	Plastic Limit
Į ₹	<u>.</u>	=	Shelby Tube			ove	RQD	etra 76	ave	Sand %	ס פר	Sor	l pir	stic
l de	Sample Type	Symbol / USCS	Rock Core			Rec		Penetration Blows / 6 inches	<u>්</u>	Š	Silt and Clay %	Water Content %	Liq	Pla
1	00	8	MATERIAL DES	CDIDTION				ã			S	×		
			MATERIAL DES	CRIPTION										
_			Coarse <u>COAL REFUSE</u>											
- - 5 - -	- - - - -													
- -10 - - -	-													
- 15 - - -	-													
-20 -													i	
Γ					23.0									
- - -25			Brown and gray <u>CLAYEY SA</u> fragments, damp, medium d	ND with sandstone					-					
	-		- SPOIL/FI	LL -					į					
2/27/	-4													
ලි – 30		لمنا	405.55 4	D	dsee-4	0		nt noted		lonet	OF A!		l l pin a	<u> </u>
ZING C00553.	omple ate Bo ate Bo	er/Geold	arted: 12/14/00 ompleted: 12/15/00	Remarks: Ground drilling operation		er w	as tir	st noted (at a d				ext P	

Pr	ojec	t Des		OG OF BORING N urry Impoundment Inv r, Kentucky			Ÿ		4	}	Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.7 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 35			Brown and gray <u>CLAYEY S</u> fragments, damp, medium o										
-45 - - 50 - 			- wet, w/sandstone boulder (@ 45 ft.			5-7-9			5.47			
- 555	X		- mostly sandstone fragmen				11-9-14						
Date Date Eng	Bori Bori	Geolog	rted: 12/14/00 npleted: 12/15/00	Remarks: Groundwat drilling operations.	er wa	us firs	st noted at	t a de			ft. du		ige

			Location: See Drawing No. C00553-1								,o		
et et	ğ.	Symbol / USCS	Surface El.: 1051.7 feet		%		Penetration Blows / 6 inches	Q.		Silt and Clay %	Water Content %	ı <u>i</u> t	1 .
,fe	Sample Type	>	Split Spoon		Recovery %	ROD	trati 6 in	Gravel %	Sand %	<u> </u>	onte	Liquid Limit	Disetic I imit
Depth, feet	dw	<u> </u>	Shelby Tube		900	ř	ene vs/	Gra	Sar	ang	er C	igui	3
	SS	Syl	Rock Core		~		Blo			iš	Wat		٩
			MATERIAL DESCRIPTION										
-		a	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense				50/2"						
		۵											
		0 .	- SPOIL/FILL -										
-		a		65.0							:		
65 –	/			00.0									
-	X	<u> :: . </u>	Brown and gray <u>SANDY CLAY to CLAYEY</u> <u>SAND</u> with some sandstone fragments, damp,				11-11-17						
_			medium dense to very dense										
_		- <u>-</u>	`										
		- <u>-</u>											
70 -	\bigvee	[·-:]					25-25-28						
_							25-25-20						
-		. · - · · · .				1							
-		1											
_		<u> -:-:</u> ::											
75 -		├. <u>.</u>											
13	\approx		•				50/4"						
-		. .]											
-		$[\cdot \cdot \cdot]$											
		. 			37	0							
_													
80 -		. .											
-			•	04.0									
_		· · ·		81.3		W. 11							
-		\angle	Brown SANDSTONE, medium hard, medium										
_	H	//	grained, weathered	83.5	88	42							
-		M	Gray <u>SHALE,</u> soft										
85 -		\langle	- interbedded sandstone (84.3' - 84.8')										
_		\leq	- interpeducu sanustone (or.o - or.o)	86.0									
_			COAL										
			_			}							
_									ļ				
-													
90-	L	ion De	oth: 105.5 feet Remarks: Grou		L	<u> </u>	st noted a		L	L			L_

Pro	ojec	t Des	LOG OF BORIN cription: Big Branch Slurry Impoundmen Martin County, Kentucky				triadeng.com		3				
			Location: See Drawing No. C00553-1										
۱	စ္ခ	ા	Surface El.: 1051.7 feet		%		n hes			8	%	, <u>.</u>	#
e e	≱	Sn	Split Spoon		ار ا	Ω	atio	% 	%	Clay	nte	Ë	Ë
Depth, feet	Sample Type	/ loc	Shelby Tube		Recovery %	RQD	s / 6	Gravel %	Sand %	Pi g	ပြ	Liquid Limit	Plastic Limit
ది	San	Symbol / USCS	Rock Core		æ		Penetration Blows / 6 inches	٥	"	Silt and Clay	Water Content %	=	ä
		0	MATERIAL DESCRIPTION				ш				>		
-			COAL		93	9							-
† -													
				94.1					:				
95-			Gray CLAY SHALE, very soft to soft, becoming										
		\langle	sandier and medium hard w/depth	-									
		\leq											
_		$\langle \rangle$											
-		$\langle \rangle$											
-		$\langle \rangle$											
100-		$\langle \rangle$											
		\langle			99	86							
		\searrow		101.6									
		\times	Gray SANDSTONE with shale laminations,										
-			medium hard, fine to medium grained										
-		$^{\prime\prime}$											
105-		//		105.5									
L -			D. W of T t Daving @ 105 5 #										
			Bottom of Test Boring @ 105.5 ft.	İ									
-													
110-													
-	ł			ļ									
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115-													
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2/27/01													
2/2	1												
වි Dat	e Bo e Bo	ion Der ring Sta ring Co r/Geolo	arted: 12/14/00 drilling operation mpleted: 12/15/00		er w	as fir	st noted a	it a d	epth	of 45	ft. d	uring)

Pro	ojec	t Des		G OF BORING N irry Impoundment Inve Kentucky			3	L	7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1057.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 5- 			Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with stragments, damp, medium d					•					
							4-4-12 7-8-10						
			- SPOIL/FI	LL -			5-44-50/4"						
- 25 -			Brown <u>SANDY CLAY to CLA</u> some sandstone fragments, dense	damp, dense to very			13-24-24						
Cor Dat Dat Eng	e Bor e Bor	/Geolo	arted: 12/8/00 mpleted: 12/9/00	Remarks:					Coi	ntinu	ed Ne	ext P	age

Pro	oject	t Des	LOG OF BORING cription: Big Branch Slurry Impoundment In Martin County, Kentucky			2	L	7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			16-37-35						
 -35-	X		37.			13-24-24						
 -40-		:=\ \ \ \ \ \ \ \	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained - iron-stained (37.0' - 39.5')			50/2"						
 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- occasional carbonaceous laminations (39.5' - 44.1')	100	75							
 - 50 - 		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- numerous carbonaceous laminations (47.0' - 52,4')	100	84							
-55- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron-stained vertical fracture (59.9' - 60.4')									
Dat Dat Eng	e Bor te Bor	r/Geolo	arted: 12/8/00 mpleted: 12/9/00					Co	ntinu	ed N	ext P	age

Pro	oject	Des	LOG OF BORING cription: Big Branch Slurry Impoundment Martin County, Kentucky				triadeng.com		3		4		
			Location: See Drawing No. C00553-1								٠		
ا يد	e g	SS	Surface El.: 1057.0 feet		%		Penetration Blows / 6 inches			Silt and Clay %	Water Content %	ij	ŧ
Depth, feet	Sample Type	, us	Split Spoon		Recovery %	RQD	ratic 5 inc	Gravel %	Sand %	[등	onte	Liquid Limit	Plastic Limit
pth,	nple	pol /	Shelby Tube		SCO.	R	enet vs / (] Srav	San	and	ر ا	quio	astic
ا ۵	Sar	Symbol / USCS	Rock Core		Ϋ́		B P	~		S	Nate		颪
			MATERIAL DESCRIPTION										
_		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained		99	79							
		<i>//</i>	- iron-stained (59.9' - 63.9')										
-65 <i>-</i> 		\ <u></u>											
		$\left[\begin{array}{c} \\ \\ \end{array}\right]$											
		×											
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-70 -		<u>```</u>]											
		/ /		ļ	100	100							
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		\mathcal{L}											
		//	- clay seam (79.1' - 80.0')										
-80-		\ <u>\</u>			40	6							
		/ /		İ	,,,				1				
		~~	Device chandened @ 94.4 ft after drilling rode	15.		ļ							
			 Boring abandoned @ 84.4 ft. after drilling rods became stuck in hole 	İ									
. -				84.4									
- 85 -		~ ~	Bottom of Test Boring @ 84.4 ft.	5-77									
	-												
			·						1				
-90 <i>-</i>		ion Da	pth: 84.4 feet Remarks:			1	<u> </u>	<u></u>	<u></u>	<u> </u>	<u></u>	<u></u>	<u> </u>
Dat Dat	e Bo e Bo	ion De ring St ring Co r/Geolo	arted: 12/8/00 completed: 12/9/00								į		

Pr	ojec	t Des		OF BORING N rry Impoundment Inve Kentucky			3		7		Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1056.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse <u>COAL REFUSE</u> Brown <u>CLAYEY SAND</u> with s	2.0									
- 5-			fragments, damp, medium de	nse to very dense									
 -10-	1												
		a											
- 15 - 													
 20-							12-12-10-54						
							39-20-14-9						
- 25 - 	X	0					34-35-26-20 16-23-50/2"						
		on Dep		L - Remarks: Water was completion.	noted	d at a	50/1" depth of	84.7	ft. up	on d	rilling	9	
Date Date Date Date Date Date Date Date	e Bor	ing Col /Geolo	mpleted: 1/18/01	completion.					Cor	ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des	cription: Big Branch Slurry I Martin County, Ken					Ų -		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. Surface El.: 1056.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPT			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		0.0	Brown <u>CLAYEY SAND</u> sandstone damp, medium dense to very dens					50/1"						
	X	a	- SPOIL/FILL -		34.0			5-14-18-17						
-35- 			Brown <u>CLAYEY SAND to SANDY</u> some sandstone fragments, damp to very dense					18-30-36-41						9
	X		·					32-75/5" 29-57-50/1"					:	
-40-														
	X	. 						28-42-42-40						
								21-27-30-32 27-24-27-29	i					
- 45 - 			CASING ADVANCE W/OUT S. (46.0' - 51.6')	AMPLING			:	21-24-21-29						
-50-		·	Brown <u>SANDSTONE</u> , medium hard grained, weathered, friable	l, medium	49.5									
 -55-														
C00653.GPJ 2/28/01			- occasional diagonal fractures (56.1' - 61.4')			98	46	·						
	e Bori e Bori	on Dep ng Sta ng Cor 'Geolo	rted: 1/17/01 com mpleted: 1/18/01	arks: Water pletion.	was r	note	d at a	depth of	84.7	ft. up	on d	rilling	 J	
	ect N		C00553							Con	tinue	d Ne	xt Pa	ge

Pr	ojec	t Des		G OF BORING N rry Impoundment Inve Kentucky			3		7		4)
			Location: See Drawing	No. C00553-1							٠,		
#	e e	SSS	Surface El.: 1056.0 feet		%		Penetration Blows / 6 inches	٠		%	Water Content %	ij	njt.
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	rratic 6 inc	Gravel %	Sand %	Silt and Clay %	onte	Liquid Limit	Plastic Limit
epth	Mg H	loqu	Shelby Tube		8	%	enet vs / (Grav	San	and	er C	iquid	astic
	Sa	Syn	Rock Core		ا مَدَ		Blo P			툸	Wat		<u>a</u>
			MATERIAL DES	CRIPTION									
		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Brown <u>SANDSTONE</u> , mediu grained, weathered, friable	m hard, medium									
-65-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			98	52							
-													į
		/ //	- gray, medium hard to hard	from 66.9 ft.							}		
70-		` <i>`</i> \							\$				
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-85-		/ /											
-		<i>///</i>											
-		/ /											
		<i>X</i> ./	- resume casing advance @	88.0 ft.									
1 2/28/01		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		89.5									
ਲੂ - 90 -	mple*	ion De _l	oth: 100.1 feet	Remarks: Water was	note	d at a	denth of	84 7	ft	on d	rillin	u	
ලි Dat	e Bo e Bo	ring Sta	arted: 1/17/01 impleted: 1/18/01	completion.		6	. aoptii Oi	⊍ 7.1	uj	-		ਤ	
Eng Pro	ginee iect l	r/Geold	ogist: JEN/JTS C00553						Coi	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORI urry Impoundme , Kentucky				ų.	L	3		4		
			Location: See Drawing	No. C00553-1								_		
#	g D	SSS	Surface El.: 1056.0 feet	t		8		Penetration Blows / 6 inches		ļ	%	Water Content %	<u>#</u>	Ħ
Depth, feet	Sample Type	Symbol / USCS	Split Spoon			Recovery %	RQD	ratio 5 inc	Gravel %	Sand %	Silt and Clay	onte	Liquid Limit	Plastic Limit
epth	m pk	loqu	Shelby Tube			S S	8	enet /s / (Srav	San	and	ŭ	pinp	astic
	Sa	Sym	Rock Core			&		Blov P	~		Silt	Vate	_ ت	ā
			MATERIAL DES	SCRIPTION				_				١		
	\setminus		VOID					wot/2'						
-	$\langle \cdot \rangle$		- slurry w/sand and gravel (8	9.8' - 93.1')										
	\triangle		- gray sandstone cobble (93	.1' - 93.8')				21/2'	27	32	41			
-95-	X		- slurry, sand, and gravel (93	3.8' - 95.8')				40/2'	34	24	42		27	21
<u> </u>			- silty sand with rock fragme	nts (95.8' - 97.8')				37/2'	47	42	11			
-			- slurry with sand and gravel	(97.8' - 99.9')					04	24	40		00	
100-			- gray clay shale (mine floor)	@ 99.9 ft.	100.1			wot/2.1'	21	31	48		33	26
-			Bottom of Test Borin	ng @ 100.1 ft.										
-							·							
-														
 105 -														
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110-				_			İ							
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ලි Date	Bori Bori	on De ng Sta ng Co 'Geolo	arted: 1/17/01 mpleted: 1/18/01	Remarks: Wate completion.	er was i	noted	l at a	depth of	84.7	ft. up	oon d	rilling	 1	
Proj	ect N		C00553											

				LO	G OF BO	RING N	10.	DH:	3-1 🥫 I		4		7		
Pr	ojec	t Des	cription:	Big Branch Slu Martin County	ırry Impound , Kentucky	ment Inve	estiga	ation	triadeng.com		5	1/			
Depth, feet	Sample Type	Symbol / USCS	Surface S s	on: See Drawing e El.: 1050.0 feet plit Spoon helby Tube ock Core MATERIAL DES		1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse	COAL REFUSE											
Date Date Date Date Date Date Date Date	te Bo te Bo	r/Geold	arted: ompleted:	120.1 feet 12/5/00 12/5/00 JEN/CEM C00553	Remarks: G drilling ope	roundwat erations.	ter w	as fir	st noted a	at a d				uring	

Pro	ojec	t Des		G OF BORING N erry Impoundment Inve Kentucky			3		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1050.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse COAL REFUSE										
-45			- wet @ 45 ft. Brown <u>CLAYEY SAND</u> with s fragments, damp, medium de	ense to dense			6-6-6 4-18-30 5-4-7						
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/5/00 mpleted: 12/5/00	Remarks: Groundwa t drilling operations.	ter w	as fir	st noted a	at a d		of 45			

Pr	ojec	t Des		G OF BORIN urry Impoundmer v, Kentucky						3		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1050.0 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	0 0 0	Brown <u>CLAYEY SAND</u> with fragments, damp, medium o					6-10-11						
- 65 - 	X							12-19-16						
- 70 - - 70 -	X	00						9-9-8						
 -75-		0	- SPOIL/F		75.0			5-10-39						
 			some sandstone fragments,											
80 								20-50/3"						
- 85 - 						20	0	50/1"						
		on Der			ıdwate			st noted a	t a de	epth o	of 45	ft. du	ıring	
Eng	e Bori	'Geolo	mpleted: 12/5/00	drilling operatio	ns.					Con	ntinue	d Ne	xt Pa	ge

Pro	ojec	t Des		G OF BORING I urry Impoundment Inv , Kentucky			ų.		3				
	Φ	SS	Location: See Drawing Surface El.: 1050.0 fee				es			%	%		_
feel	Typ)SN	Split Spoon		چ ا		ation	%	%	ä	Je Je	Ē	Ë
Depth, feet	Sample Type	/ loq	Shelby Tube		Recovery %	RØB	netra s / 6	Gravel %	Sand %	P P	Š	Liquid Limit	Plastic Limit
۵	Sar	Symbol / USCS	Rock Core		å		Penetration Blows / 6 inches	٥	%	Silt and Clay	Water Content %	Ę	Pla
			MATERIAL DE	SCRIPTION							5		
			Brown <u>SANDY CLAY to CL</u> some sandstone fragments	AYEY SAND with damp, very dense	48	14							
- 95 - 					8	8							
 			Gray <u>SANDSTONE</u> with sha medium hard, fine to mediur										
 - 105 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	medium naru, ilile to mediui	n granieu	88	81							
 410-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
 - 115 -					100	98							
 Com Date Date Engi													
Com Date Date	Bori Bori		rted: 12/5/00 npleted: 12/5/00	Remarks: Groundwat drilling operations.	er wa	as fir:	st noted a	t a de	epth (of 45	ft. dı	uring	
Engi Proje		Geolog	gist: JEN/CEM C00553						Con	itinue	d Ne	xt Pa	age

Pro	ojec	t Des	cription:		G OF BO urry Impound , Kentucky				Ψ.		7				
Depth, feet	Sample Type	Symbol / USCS	Surfac S S	on: See Drawing e El.: 1050.0 feet plit Spoon helby Tube ock Core MATERIAL DES		-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
				Bottom of Test Borin	ng @ 120.1 ft.	120.1									
125 - 						į				3					
130 –															
135 -															
40 -															
45 -															
Date	Bor	on Del		120.1 feet 12/5/00 12/5/00	Remarks: G	roundwat rations.	er wa	as firs	st noted a	at a d	epth	of 45	ft. d	uring	l

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 - 15- 																	
- 10- - 10-	}									10 TV							
	}													,			
 - 5-	}																
]	Š	syr		MAT COAL R		ESCRIPT	ION	· · · · · · · · · · · · · · · · · · ·	<u>«</u>					Silt	Wat		
Depth, feet	Sample Type	Symbol / USCS	Surfac Surfac	on: See e El.: 1 plit Spoon helby Tub	051.4 fe	-	50055 5	-1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	

Pr	ojec	t Des	LOG OF BOR cription: Big Branch Slurry Impoundm Martin County, Kentucky				<u> </u>		7	}	7		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	1	\bigotimes	Coarse <u>COAL REFUSE</u>	32.0									
	ł	a	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense	•									
-35-	X	a					5-8-7						
 	-	a			100								
-40 - 	X	0 a	- wet @ 40 ft.				7-6-21						
		a											
-45- 	X	a					5-9-6			:			
		a	·										
-50-	X	, , a	- boulder @ 51 ft.				8-15-13						
		a							-				
- 55 - 	X	a					7-20-50/1"						
		. · . · a	- SPOIL/FILL -										
		ion Der			er wa	as fir	st noted a	t a d	epth	of 40	ft. d	uring	1
Dat Dat Eng	e Bor	ring Co r/Geolo	mpleted: 12/6/00						Coi	ntinu	ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve , Kentucky			<u> </u>	L	3				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
_	X		Brown SANDY CLAY to CLA some sandstonne fragments dense to dense				20-26-33						
 -65-	X		- boulder @ 65 ft.				50/6"						
 - 70 - 	X		- trace coal fragments @ 70	ft.			17-19-20						
 -75- 	X						17-19-17						
- 80 - 80 	X						6-5-10						
- 85 - 			- SPOIL/F	ILL - 87.8			38-18-22-28 14-30-50/2"						
- -90-			COAL			- C - C - C - C - C - C - C - C - C - C		• • • •	onth	05 40) ft d		
Date Date Eng	e Bo e Bo	r/Geolo	arted: 12/6/00 ompleted: 12/6/00	Remarks: Groundwat drilling operations.	er W	as Tir	St noted a	ı. a Q		ot 40			

Pr	ojec	t Des	Martin County, I		vestig	ation	3-2 moo:dend:ruidend:	L	-			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing I Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit
			COAL		73	0						
- 95 - - 95 - 			Gray <u>CLAY SHALE,</u> very soft t sandier and medium hard with		0 100	40						
105 105 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale medium hard, fine to medium o		100	96						
-110 - 		\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	Bottom of Test Boring	110. @ 110.5 ft.	5					1		
 -115- 												
Date Date Eng	e Bori e Bori	/Geolo	nrted: 12/6/00 mpleted: 12/6/00	Remarks: Groundw drilling operations.	ater wa	as fir	st noted a	at a d	epth (of 40	ft. du	uri:

Pro	oject	Desc	cription:		G OF BORII urry Impoundme , Kentucky			<u> </u>		7		4		
Depth, feet	Sample Type	Symbol / USCS	Surface Surfac	on: See Drawing e El.: 1052.7 feet plit Spoon helby Tube ock Core MATERIAL DES	•	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			oth:	105.1 feet 12/6/00		er wa	as fir	st noted a	t a d	epth	of 35	ft. d	uring	
Date Date Eng Proj	e Bor	/Geolo	mpleted:	12/6/00 12/7/00 JEN/CEM C00553	drilling operati						ntinue	ed Ne	ext Pa	age

Pr	oject	Des	cription: Big Branch Slu	G OF BORING N			3-3 Liadeng.com		2		A		
		Т	Martin County,	Kentucky		· · · · · ·	triac						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.7 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	·	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown and gray <u>CLAYEY SA</u> fragments, damp, loose to m				5-3-6						
- 35 - 			- wet @ 35 ft.				3-3-6						
40 - 			- Unable to push shelby tube fragments	@ 40 ft. due to rock			31-28-9						
45 - 			- SPOIL/FI	ILL			3-6-21						
- 50 - 			Brown <u>SANDY CLAY to CLA</u> some sandstone fragments,	YEY SAND with damp, dense			23-26-28						
PJ 2/27/01							18-25-26	an c					
Da Da En	te Bo	r/Geolo	arted: 12/6/00 ompleted: 12/7/00	Remarks: Groundwa t drilling operations.	ter w	as fir	st noted a	at a d				urinç ext P	

Pro	ojec	t Des	cription: Big Branch SI Martin County					. 9		3	} /			
Depth, feet	Sample Type	Symbol / USCS	Surface El.: 1052.7 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown <u>SANDY CLAY to CL</u> some sandstone fragments					32-24-22						
-65- 	X		- boulder @ 65 ft.					50/3"						
- 70 -	~				70.0			50/2"						
		<i>`</i> ,	Gray <u>SANDSTONE</u> , fine to medium hard to hard	medium grained,			, ,							
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron-stained vertical fractur	re (70.8' - 71.1')	į	ا								
-75- 		`\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				89	81							
-80- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\												
 -85-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				99	66							
		<i>Y</i>	COAL		86.7									
Date Date Eng	Bori Bori	/Geolo	rted: 12/6/00 mpleted: 12/7/00	Remarks: Groundrilling operation		er wa	as firs	st noted a	t a de		of 35		_	

Pro	ojec	t Des	LOG OF BORI cription: Big Branch Slurry Impoundme Martin County, Kentucky				3		7		A		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.7 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 -			- unconfined compressive strength (93.0' - 93.3') - 3,600 psi		100	22							
 		$\mathbb{N}^{\mathbb{N}}$	- unconfined compressive strength (95.5' - 95.8') - 3,780 psi Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	96.6									
 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale laminations, medium hard to hard, fine to medium grained	101.8	100	100							
 			Bottom of Test Boring @ 105.1 ft.										
Date Date	e Boi e Boi	r/Geold	arted: 12/6/00 drilling operat		ter w	as fir	st noted a	at a d	epth	of 35	ft. d	uring	

Pro	ojec	Des		G OF BORING Irry Impoundment Ir Kentucky			3.		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1053.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 10			Brown CLAYEY SAND with a fragments, damp, medium de shelby tube (20.0' - 21.2') to clayey sand with sandstone attempted shelby tube @ 2 (no recovery)	orown and gray refragments s (25.0' - 26.5') 5.0 ft.	83		24-10-8						
Date Date	e Bor e Bor	/Geolo	oth: 105.1 feet urted: 12/7/00 mpleted: 12/7/00			as fir	st noted a	t a d		of 35			

Pr	ojec	t Des		G OF BORING Nurry Impoundment Inve Kentucky			3		7		A	\[)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1053.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	i	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown <u>CLAYEY SAND</u> with fragments, damp, medium d				4-5-29						
- 35 - 	X						31-21-11						
 40- 	X						10-10-11						
45-			- SPOIL/FI	LL - 45.0									
	X		Brown <u>SANDY CLAY to CL/</u> some sandstone fragments,				22-26-27						
-50 - 	X						20-23-30						
- 55 -			Gray <u>SANDSTONE</u> , mediun medium grained, with occas				50/5"						
GPJ 2/27/01			laminations - iron-stained, moderately w (55.0' - 64.2')	eathered									
Cor Dat Dat Eng	e Bor e Bor	/Geolo	arted: 12/7/00 impleted: 12/7/00	Remarks: Groundwat drilling operations.	er w	as fir	st noted a	it a d				uring ext Pa	

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve , Kentucky			3	L	7		4		
			Location: See Drawing								\o		
et	/pe	Symbol / USCS	Surface El.: 1053.9 feet	t	%		Penetration Blows / 6 inches	9		3x %	Water Content %	ŧ	ij
Depth, feet	Sample Type		Split Spoon		Recovery %	Rab	frati 6 in	Gravel %	Sand %	Silt and Clay	onte	Liquid Limit	Plastic Limit
Sept	amp	oqu	Shelby Tube		Seco.	œ	ene ws /	Gra	Sal	tanc	ter C	igui	last
	Š	Syl	Rock Core		œ		88			S	Wat	_	1
			MATERIAL DES	SCRIPTION									
			Gray <u>SANDSTONE</u> , mediun medium grained, with occas laminations				50/1"						
		[96	74							
-		$[\check{\ \ }]$	diamonal fracture @ 62 F ff										
-65-		$^{\prime\prime}$	- diagonal fracture @ 62.5 ft	•				:					
		//				. *.*							
		× <u>/</u>	- iron-stained diagonal fractu	ıre (66.6' - 66.8')									
		\times											
		//											
		ľŽ											
-70-		$\langle \rangle $			100	94							
		\leq											
		׸<											
		//											
-75-		ľÝ]											
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		$ \lambda $											
-80-					99	99							
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- 85 -													
_		[` <i>`</i> `}]											
		$ \tilde{\ } $											
		\checkmark		87.6									
			VOID								ļ		
Date Date	e Bor e Bor		arted: 12/7/00 mpleted: 12/7/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	t a d	epth	of 35	ft. d	uring	l
	ineer ect N	/Geolo	gist: JEN/CEM C00553						Cor	ntinue	ed Ne	ext Pa	аае

		"	Location: See Drawing No. C00553-1			တ္			٠	%		
ا <u>بر</u>	ype	Symbol / USCS	Surface El.: 1053.9 feet	%		Penetration Blows / 6 inches	%	<u>%</u>	Silt and Clay %	Water Content %	nit Li	7,
Deptn, reet	Je T	U/10	Split Spoon	Recovery %	Rab	etrat / 6 ir	Gravel %	Sand %	[등	Son	Liquid Limit	# I - : # I O
e l	Sample Type	/mp	Shelby Tube Rock Core	Rec		Pen	ြိ	Š	ii a	ater	Ęi	, i
	0,	Ś	MATERIAL DESCRIPTION			<u> </u>			S	>		
-			VOID - void sample (87.6' - 97)' slurry and sand									
			1.1% gravel	34	17							
			78.9% sand									
5 –			20.0% silt and clay									
-			97.0									
-		000	Broken Coal and Mine Rubble	1								
-	3	\geq	98.1	1								
-		\leq	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard increasing depth									
0-		WWW.	Salluler and medium hard increasing depth									
-		\leq										
_		\langle	102.0	400	40							
		5	102.8	100	42							
-		\\{\text{\chi}\}	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained		1							
5		×4	105.1		-							
4			Bottom of Test Boring @ 105.1 ft.									
4												
4												
4												
0-												
5-					35							
-												
-												
-				i.								
_							İ					
0-					<u> </u>	st noted						

Pro	ojec	t Des	cription:						1-1	L	7				
Depth, feet	Sample Type	Symbol / USCS	Surface Surface Surface	on: See Drawing e El.: 1050.9 fee split Spoon shelby Tube cock Core MATERIAL DES	i	1	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
S Date	e Bori	Dep ing 5 ta	th:	111.2 feet 12/14/00	Remarks: Gr drilling oper	oundwat ations.	er wa	ıs firs	et noted a	at a de	epth	of 43	ft. de	uring	
Date Eng Proj	e Bori	ing Cor /Geolog	npleted:	12/18/00 JEN/JTS C00553		•					Cor	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve Kentucky			3		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1050.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Coarse <u>COAL REFUSE</u>	43.0									
- 45 - - 50 - 			Brown and gray <u>CLAYEY SA</u> fragments, damp to wet, med - very sandy (43.0' - 51.0')	ND with sandstone			5-7-10-16 8-9-16-17 10-18-22-12 7-10-10-10						
- 55 - 			- SPOIL/FII	.,,,			5-10-18-17 7-18-29-15 15-13-11-15						
Con Date Date Eng	e Bor e Bor	/Geolo	nted: 12/14/00 mpleted: 12/18/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	t a d		of 43			

Pr	ojec	t Des	LOG OF BORIN cription: Big Branch Slurry Impoundmen Martin County, Kentucky				٩.		7	}			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, medium dense to dense				15-13-11-15						
			- root traces (61.0' - 63.0')				8-9-8-9						
-65 	X		- SPOIL/FILL -	66.9			3-8-20-28						
	X		Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense - some gray mottling and trace coal fragments				8-30-48-75						
-70 <i>-</i>	X		(67.0' - 69.0')		71		28-52-37-43						
	X		 shelby tube (71.0' - 71.7') brown and gray clayey sand to sandy clay with some sandstone fragments 				15-10-18-19						
-75 <i>-</i>							50/3"						
	X					Ξ	20-34-29-20						
- 80 - 	X	· : : : : : : : : : : : : : : : : : : :	Brown <u>SANDSTONE</u> , soft, weathered, friable, .	80.0			4-40-59-60 						
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					81-64/2"						
85 -		\	COAL	85.2			36-50/2"						
7 7 7					95	0							
Date Date Date Date Date Date Date Date	te Bori te Bori	/Geolo	rted: 12/14/00 drilling operation mpleted: 12/18/00		er wa	as fir	st noted a	t a d		of 43		_	

Pr	ojec	t Des	LOG OF Escription: Big Branch Slurry Impo Martin County, Kentuck				٦	Ī	4	}	4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00 Surface El.: 1050.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-			<u>COAL</u>										
 - 95 -		$\wedge \wedge \wedge \wedge$	Gray <u>CLAY SHALE,</u> very soft to soft, be sandier and medium hard with depth	94.5 ecoming	100	24							
 400 -				101.4	100	92							
 		(Gray <u>SANDSTONE</u> with shale laminatio medium hard, fine to medium grained										
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron-stained (107.5' - 108.0')	,	100	96							
110-											į		:
			Bottom of Test Boring @ 111.2	111.2 ft.									
115 - 													
120 120 1													
Date Date	e Bor e Bor	/Geolo	arted: 12/14/00 drilling of mpleted: 12/18/00	Groundwat operations.	er wa	as fir	st noted a	t a de	epth (of 43	ft. dı	uring	

Proj	ject C		G OF BORING N urry Impoundment Invo ,, Kentucky			Ų	Ī	3				
Depth, feet	Sample Type	Location: See Drawing Surface El.: 1056.0 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 5-		Coarse COAL REFUSE Brown CLAYEY SAND with fragments, damp, medium of the control										
- 10		- trace slurry (15.0' - 16.5')				9-8-4						
-20		a - boulders (21.7' - 27.0')		·	-	3-5-6						
-25		a - SPOIL/FII				50/0"						
Date B	Boring Boring eer/Ge	Depth: 107.0 feet Started: 12/5/00 Completed: 12/6/00 Dlogist: JEN/JTS C00553	Remarks: Water was no completion.				75.5 f	·	on dr			ge

Pr	ojec	t Des		G OF BORII urry Impoundme v, Kentucky				ų.	L	7	}			
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1056.0 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-	X		Brown SANDY CLAY to CL some sandstone fragments					18-28-28						
- 35	X				20.5			12-17-38	,					
-40 - 			Brown <u>SANDSTONE</u> , media grained, moderately weathe		39.5	85	20	50/0"	-					
 -45-			- gray, hard from 43 ft.				-				1. A			
 - 50 -						99	80							
		/////												
- 555 1 - 1 - 1			- w/occasional carbonaceou (43.0' - 53.8')	s laminations		100	97							
Date Date	Bori Bori	'Geolo	nted: 12/5/00 mpleted: 12/6/00	Remarks: Water completion.	r was ı	noted	d at a	depth of	75.5 f				s xt Pa	age

Pro	ojec	t Des	cription: Big Branch Slurry Impoundment I			9						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
1 1 1			Gray <u>SANDSTONE</u> , hard, medium grained									
65-		<i>//</i>	- iron-stained (63.5' - 66.4')									
			- fractured (65.9' - 66.4)	99	87							
70 -			- iron-stained (70.0' - 72.8') and (76.4' - 76.6')									
75 -			- iron-stained vertical fracture ((77.0' - 77.4')	99	93							
85 – -				100	81							
		× M	88 Gray <u>SHALE</u> , soft to medium hard	.7								
Date Date	Bori Bori neer/	Geolog	rted: 12/5/00 completion.	s note	ed at a	depth of	75.5				g ext Pa	aae

Pro	ojec	t Des	LOG OF BORIN cription: Big Branch Slurry Impoundmen Martin County, Kentucky				triadeng.com		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
_		> .	COAL	90.8									
 - 95 - 			 unconfined compressive strength (91.3' - 91.5') - 3,970 psi unconfined compressive strength (96.6' - 96.9') - 4,040 psi unconfined compressive strength (97.5' - 97.8') - 2,940 psi Gray <u>CLAY SHALE</u>, very soft to soft, becoming sandier and medium hard with depth 	98.4	99	24							
 405- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained.	105.6	100	86							
 -110- 			Bottom of Test Boring @ 107 ft.										
115 - 				1									
Date Date Eng	e Bo e Bo	r/Geolo	arted: 12/5/00 completion.	r was ı	note	d at a	depth of	75.5	ft. u	pon c	Irillin	g	*

Proje	ect Des	cription:		G OF BORIN erry Impoundmen Kentucky					3		4		
Depth, feet	Symbol / USCS	Surface s	on: See Drawing e El.: 1055.7 feet plit Spoon helby Tube ock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 10			AUGER WITHOUT										
Date E	er/Geol	arted: ompleted:	105.0 feet 1/9/00 1/9/00 JEN/CEM C00553	Remarks: Grou	ndwater w ons.	as fir	st noted a	at a d		of 45			

Pr	oject	Des		G OF BORING rry Impoundment In Kentucky			P-2 Intringending		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.7 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			AUGER WITHOUT		0.0								
-50 - 			Gray <u>SANDSTONE</u> , medium medium grained - soft weathered zone @ 53.2										
2 2/27/01		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron-stained (53.2' - 54.0') a - diagonal fracture @ 51.3 ft.		94	63							
Date Date Date Date Date Date Date Date	te Bor te Bor	/Geolo	arted: 1/9/00 mpleted: 1/9/00	Remarks: Groundy drilling operations		as fir	st noted a	at a d		of 45			

MATERIAL DESCRIPTION Gray SANDSTONE, medium hard to hard, medium grained - low-angle fracture @ 62.3 ft. - fractured (62.8' - 63.8') - iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') 100 100 100 100 - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	Pro	jec	t Des	cription: Big Branch Slurry Impoundment Ir Martin County, Kentucky	nvestig	ation	P-2 I						
MATERIAL DESCRIPTION				Location: See Drawing No. C00553-1									
### MATERIAL DESCRIPTION Gray SANDSTONE medium hard to hard, medium grained	ای	e	SS	Surface El.: 1055.7 feet	8		n hes	_		%	% 	. <u>=</u>	ij
### MATERIAL DESCRIPTION Gray SANDSTONE medium hard to hard, medium grained		Ţ	SD.	Split Spoon	ery (Q	atio	% 	% F	Cla	ute	Liquid Limit	Plastic Limit
### MATERIAL DESCRIPTION Gray SANDSTONE medium hard to hard, medium grained	ŧ.	nple	/ loq	Shelby Tube	Š	8	s / 6	ıav	Sanc	Pug Sug	ပို	pin.	stic
### MATERIAL DESCRIPTION Gray SANDSTONE medium hard to hard, medium grained	ا ¤	Sar	ym	Rock Core	&		P S S	۳	"	Sit	Vate	Ë	풉
medium grained - low-angle fracture @ 62.3 ft. - fractured (62.8' - 63.8') - iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained wertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')				MATERIAL DESCRIPTION							>		
- fractured (62.8' - 63.8') - iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')	_		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained									
- fractured (62.8' - 63.8') - iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')			Ĭ,						İ	İ			
- fractured (62.8' - 63.8') - iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')			$^{\prime}/$	- low-angle fracture @ 62.3 ft.									
- iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') 100			<i>`</i> ~		100	67				1			
- iron-stained, w/occasional vugs (62.8' - 67.8') - clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')	35 —		\times	- fractured (62.8' - 63.8')						ŀ			
- clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	-												
- clay seam (66.8' - 67.0') - iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')	-		$^{\prime\prime}$	iron-stained w/occasional vugs (62.8' - 67.8')]				
- iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	_		\vee	non stamou, througholds rags (52.5 °C).57									
- iron-stained (70.9' - 71.9') - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')			\ <i>`</i> ./										
- iron-stained (70.9' - 71.9') 100 100 - iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	_		$\left \frac{1}{2} \right $	- clay seam (66.8' - 67.0')									
5	0 –		ľ Ž		:								
- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')	-		\times	- iron-stained (70.9' - 71.9')									
- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	-		//										
- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	-		//										
- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')			/ /		100	100							
- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3') - iron-stained (80.0' - 87.5')	5 –		Ĭ~Ĭ		100	100							
- iron-stained vertical fracture (81.3 - 84.3) and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')			\leq				·						
- iron-stained vertical fractule (81.3 - 84.3) and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')			V./										
- iron-stained vertical fracture (81.3 - 84.3) and (87.0' - 87.3') - iron-stained (80.0' - 87.5') - iron-stained (80.0' - 87.5')	-		\times										
- Iron-stained vertical fracture (81.3 - 84.3) and (87.0' - 87.3')	-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \										
- Iron-stained vertical flacture (81.3 - 84.3) and (87.0' - 87.3') - Iron-stained (80.0' - 87.5') - Iron-stained (80.0' - 87.5')			$^{\prime\prime}$										
- Iron-stained vertical flacture (61.3 - 84.3) and (87.0' - 87.3') - Iron-stained (80.0' - 87.5') - Iron-stained (80.0' - 87.5')	so –		\leq	in a state of continuity fractions (04.21, 04.21)									
	_	l	$ \mathcal{Y}_{\mathcal{A}} $										
- iron-stained (80.0' - 87.5')			/ /	,									
- iron-stained (80.0' - 87.5')	_		Ĭ /										
- iron-stained (80.0' - 87.5')	-		\leq										
- iron-stained (80.0' - 87.5')	_	Н	~\		80	29							
	35 –			iron stained (90.0' 97.5')									
	_		[`	- iron-stained (60.0 - 67.5)									
			\times										
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	-		\angle										
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			\angle	10505			-4 4						
Completion Depth: 105.0 feet Date Boring Started: 1/9/00 Date Boring Completed: 1/9/00 Remarks: Groundwater was first noted at a depth of 45 ft. dur drilling operations.	Date	Bor	ing Sta	arted: 1/9/00 drilling operations		as fir	st noted a	it a d	epth	of 45	it. d	uring	

Pro	ojec	t Des		G OF BORING Irry Impoundment In Kentucky			3	L	3		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.7 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 - 			Dark gray <u>CARBONACEOU</u> hard <u>COAL</u>	90. S SHALE, medium 91.		10							
100 -		\sim	Gray <u>CLAY SHALE,</u> very so	100. ft to soft	95	58							
105 - 110 -			Bottom of Test Bori										
415-													
Dat Dat Eng	e Bo e Bo	r/Geold	arted: 1/9/00 impleted: 1/9/00	Remarks: Groundw drilling operations.		as fir	st noted	at a d	epth	of 45	ift. d	uring	3

Pr	oject	Desc		G OF BORING I urry Impoundment In Kentucky			<u> </u>		7	})	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
- 15 - - 15 - 	X	. · . · . l	-boulder (20.0 - 22.0 ft.)				45-27-36							
-20 - - 25 -			- boulder (25.0 - 26.0 ft.)				50/2"							
Dat	e Bori e Bori	on Dep	rted: 12/11/00 npleted: 12/11/00	LL - 30.0 Remarks: Water was completion.		d at a	depth of	84.6		oon d		_		

Pr	ojec	t Des		G OF BORIN urry Impoundmen Kentucky			3		3			\[)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 35-			Brown SANDY CLAY to CLA some sandstone fragments, dense to very dense				7-13-10						
 	X		Gray <u>SANDSTONE,</u> mediun	n hard to hard	38.0		15-48-50/3"						
-40- 	\times		medium grained - brown, weathered and friab (38.0' - 40.4')		93	0	50/3"						
		\ \ \ \ \	- with occasional carbonaced (42.1 - 48.6 ft.)										
- 45 - 			-iron stained vertical fracture - with numerous carbonaceo (48.6 - 56.5 ft.)		100	86							
 - 50 -									3			1	
	•												
- 55 - 					99	90					į		
33.GPJ 2/28/01	nleti	on De	oth: 106.8 feet	Remarks: Water	was note	ed at a	a depth of	84 6	ft. ur	oon d	rillin	n	
Date Date Eng	e Bor e Bor	ing Sta ing Co /Geolo	arted: 12/11/00 mpleted: 12/11/00	completion.	7743 HULE	a al c	. aepui Oi	J- 7. U		ntinue			age

Pro	ojec	t Des		OF BORING Norry Impoundment Inv Kentucky			triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DESC		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> , medium medium grained	hard to hard,		, ikr							
 65			- fractured (68.0 - 68.3 ft.)									:	
			- iron stained (70.2 - 71.8 ft.)		100	93					į		
- 70 -		\ \ \ \ \ \	 vertical iron stained fracture vertical iron stained fracture 								•		
		\ \ \ \ \ \											
-75-													
					95	77							
 -80-) / / / / /											
- 85-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			100	100							
 		<i>*</i> /		87.4									
-		~~	VOID	89.4	18	8							
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/11/00 mpleted: 12/11/00	Remarks: Water was completion.	note	d at a	depth of	84.6		oon d			age

	Γ		Martin County, Kent	ucky	ı		Triadeng.com					N.	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C Surface El.: 1055.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	
			Gray <u>SANDSTONE</u> , iron stained, m hard, fine to medium grained	edium hard to 90.1									
- 95			VOID - void sample (89.4' - 91.9') brown swith rock fragments 17.9% gravel 55.0% sand	silty sand									
		W	27.1% silt and clay Gray <u>SHALE</u> , soft to medium hard	96.9	42	18							
100-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- with occasional siltstone lenses (96.9 - 98.2 ft.) - clayey, soft (98.2 - 99.6 ft.)										
		WWW.	- silty, medium hard (99.6 - 103.7 ft.	103.7									
105 –		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with occasional laminations, medium hard, fine grain		98	70							
			Bottom of Test Boring @ 10										
110-													
 115-													
· -			·										
Date Date Engi	Bori Bori	Geolo:	rted: 12/11/00 comp npleted: 12/11/00	rks: Water was i Dietion.	noted	at a	depth of	84.6	l	on d	l		

	,,,,,,	Des	criptior Locat	Mar	tin Coun	Slurry Imp ty, Kentuc ng No. C0	ky	iii iiive	suge		triadeng.com						
_	g	છ			1055.5 fe	_			%		Penetration Blows / 6 inches			%	Water Content %	ڀ	
Depth, feet	Sample Type	, us	\boxtimes	Split Spoo	on				Recovery %	ا ۾ ا	ratio S inc	Gravel %	8	Silt and Clay %	onte	Liquid Limit	Plactic Limit
<u> </u>	ngle	l l l		Shelby Tu	ıbe				COV	RQD	sneti s / 6	Srav	Sand %	and	ပို) pint	l jac
ا ۵	Sar	Symbol / USCS		Rock Cor	е				ag		30 Pe		"	Silt	Vate	Ĕ	ă
				M/	ATERIAL D	ESCRIPTIO	N								۸		
_		<u> </u>	Coar	se <u>COAL</u>	<u>REFUSE</u>			0.7									
		a	Brow	n <u>CLAYE</u>	Y SAND wi	th sandstone	en, dense										
1	I	a	ırayı	nents, dar	np, median	i delise to ve	ery dense										
5-		0 .		AUG	SER W/OU	T SAMPLING	3										
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+	4	ο΄.			J. J. L.	· · · ·											
		on Der ing Sta		106.6 12/12		Remark compl		er was	note	d at a	depth o	f 83.9	ft. u	oon o	Irillin	g	L

Pr	oject	Des		G OF BORING irry Impoundment I Kentucky			<u> </u>		3		4)
			Location: See Drawing	No. C00553-1									
	_e	SS	Surface El.: 1055.5 feet		%		Penetration Blows / 6 inches	_		%	Water Content %	ij	#
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	ratic 5 inc	Gravel %	Sand %	Silt and Clay %	onte	Liquid Limit	Plastic Limit
듍	nple	loq	Shelby Tube		8	&	anet /s / (3rav	San	and	ŭ	quid	astic
ď	Sar	Sym	Rock Core		&		8 8 8			Silt	Nate		Ы
			MATERIAL DES	CRIPTION									
		0	Brown <u>CLAYEY SAND</u> with s fragments, damp, medium d										
L -	4	ο . a											
-35- 	ł		AUGER W/OUT S	SAMPLING									
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-50-	4		- SPOIL/FI	LL -									-
		· · · · ·		52	2.0								
-		Ľy	Gray <u>SANDSTONE</u> , medium medium grained	n hard to hard,									
 -55-		<i>`</i> ,				<u>.</u>							
2/01		`/ // //	- brown, weathered and friab (52.0' - 56.4')	ole	100	97							
% - 60		/ /		p		<u> </u>							
Co Co Da Da	te Bo		arted: 12/12/00 mpleted: 12/13/00	Remarks: Water w completion.	as note	ed at	a depth of	f 83.9					
	ginee oject N	r/Geold	C00553						Co	ntinu	ed N	ext P	age

Pro	ojec	t Des		OF BORING N rry Impoundment Inve Kentucky				L	3		1		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray <u>SANDSTONE</u> , medium medium grained	hard to hard,	100	100							
-65- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	 weathered, iron stained, wit clayey shale lenses, soft iron stained (69.5 - 70.1 ft. 		99	71							
 -70 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron stained vertical fracture	(69.8 - 70.1 ft.)									
 - 75 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			100	89							
 - 80 -								-					
 -85-													
		\ \ \ \ \ \ \ \	VOID	88.5	39	38							
Dat Dat Eng	e Bo e Bo	r/Geold	oth: 106.6 feet arted: 12/12/00 mpleted: 12/13/00	Remarks: Water was completion.	note	d at a	depth of	83.9		oon c			age

Pro	ojec	t Des	LOG OF BORING cription: Big Branch Slurry Impoundment I Martin County, Kentucky				triadeng.com				Δ		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	O ververed	necovery 70	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95 - 			VOID - void sample - coal slurry with sand and gravel 3.2% gravel 26.7% sand 70.1% silt and clay										
 400 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SHALE</u> , soft to medium hard - clayey, soft (98.5 - 101.7 ft.) - silty, medium (101.7 - 104.3 ft.)	8.5	9	60							
			Gray <u>SANDSTONE</u> with occasional shale laminations, medium hard, fine grained Bottom of Test Boring @ 106.6 ft.	6.6									
410 - 415 -													
Date Date Eng	e Boi e Boi	r/Geolo	arted: 12/12/00 completion. mpleted: 12/13/00	as no	tec	l at a	depth of	83.9	ft. uţ	oon d	Irillin	g	

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve , Kentucky			triadeng.com	L	7		4)
			Location: See Drawing	No. C00553-1									
ļ.,	o o	၂ ဗွ	Surface El.: 1052.3 feet		٠		r Jes			%	t %		<u></u>
Depth, feet	ξ) NSO	Split Spoon		Recovery %		ation	%	8	Slay	nten	Liquid Limit	Plastic Limit
j,	be	/ lo	Shelby Tube) ove	RQD	netra	Gravel %	Sand %	D pu	S	nid 1	stic
Del	Sample Type	Symbol / USCS	Rock Core		Rec		Penetration Blows / 6 inches	<u> </u>	S	Silt and Clay %	Water Content %	Ë	Pla
	"	S	MATERIAL DES	SCRIPTION			æ			S	>		
		\otimes	Coarse COAL REFUSE										
		\otimes											
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- 5-				5.0									
L _			Brown CLAYEY SAND with	sandstone									
			fragments, damp, medium d				:						
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2//2		٥	- SPOIL/FI	LL -									
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Dat	e Bor e Bor	ion Der ing Sta ing Co /Geolo	nted: 12/11/00 mpleted: 12/11/00	Remarks: Groundwat drilling operations.	er wa	as fir	st noted a	it a d					
Bro	iect N		C00553						Col	ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des		Branch Si		ORING Nundment Inve			X- 3	triadeng.com	3				
			Location: Se	e Drawing	g No. C005	53-1									
	e	ပ္သ	Surface El.:	1052.3 fee	t		8		n hes	1.		%	Water Content %	<u>=</u>	 <u>#</u>
Depth, feet	Sample Type	Symbol / USCS	Split Spoo	n			Recovery %	۵	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	ute	Liquid Limit	Plastic Limit
l ta	l du	loq	Shelby Tu	be			Š	Rab	aneti) rave	Sanc	and	ပို့	Pig.	astic
ľ	Sat	Sym	Rock Core)			&		Now No.		"	Silt	Vate	Ĕ	₫
			MA	TERIAL DE	SCRIPTION								^		
		a	Brown CLAYEY	SAND with	sandstone										
			fragments, dam			dense									
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C00553.GPJ 2/28/01	nnleti	on Dep	th: 105.4 f	eet	Remarks:	60.0 Groundwat	er wa	as fir	st noted	lata d	enth .	of 50	n ft	durin	<u>_</u>
Dat	e Bori	ng Sta	rted: 12/11/0	00		perations.	UI 440	AU 1113	ot mot o t	. u. a u	-hm	J. JU.	. o 11.	uurii	.a
Dat	e Bori	ng Cor	mpleted: 12/11/0)0 = M		÷ ,									
	ineer/ ject N	Geolog	C0055								Cor	ntinue	d Ne	xt Pa	age

Pr	ojec	t Des		G OF BORIN urry Impoundme Kentucky				2		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.3 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X		Brown <u>SANDY CLAY to CLA</u> some sandstone fragments, dense to very dense	YEY SAND with damp, medium				12-21-28						
 -65 - 	X							22-31-32						
 -70-			Brown <u>SANDSTONE</u> , mediu	m hard, medium to	70.0			50/1"						
			coarse grained, moderately to diagonal fracture at 72.1 ft.	weathered, friable										
- 75 - 		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				95	56							
-80-	-													
 - 85 -		V ,	COAL - unconfined compressive st	rength	82.5	2	0							
3/01			(89.5' - 89.8') - 4,770 psi - unconfined compressive st											
3PJ 2/2E			(91.6' - 91.9') - 3,100 psi			100	86							
Dat Dat Eng	te Bo te Bo	r/Geolo	arted: 12/11/00 ompleted: 12/11/00	Remarks: Grou drilling operati		er w	as fir	st noted a	t a d		of 50			

Pro	ojec	t Des		G OF BORIN urry Impoundmen Kentucky				triadeng.com	Ĺ	7		4)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.3 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			COAL - unconfined compressive st (93.5' - 93.8') - 3,270 psi	rength	93.8									
-95- 		MMMMM	Gray <u>CLAY SHALE,</u> very so	ft to soft		100	56							
100-		MM			100.8									
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with sha medium hard, fine grained	le laminations,		46	22							
-105 - 		/	Bottom of Test Borin		105.4									
 -110 - 							- 12 - 14 (2011) - 14 (14 (14 (14 (14 (14 (14 (14 (14 (14							
 -115-				•			Section 1							
				•										
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/11/00 impleted: 12/11/00	Remarks: Grour drilling operation		er wa	as fir	st noted a	ıt a d	epth	of 50	.0 ft.	durii	ng

Pro	ojec	t Desc		G OF BORIN Irry Impoundmen Kentucky				triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW		sandstone ense to very dense Remarks: Groun		er wa	as fire	st noted a	at a d	epth	of 67	ft. d	uring	
Date Date Eng	e Bor e Bor	ing Sta ing Co r/Geolo	nted: 12/14/00 mpleted: 12/15/00	drilling operatio	ns.					Соі	ntinu	ed Ne	ext Pa	age

Pro	ojec	Des		G OF BORING N urry Impoundment Inv Kentucky					7		4		
			Location: See Drawing	No. c00553-1					l.				
	be	ပ္လ	Surface El.: 1051.8 feet		%		Penetration Blows / 6 inches			%	Water Content %	⊭	ŧ
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	ratic 6 inc	Gravel %	Sand %	Silt and Clay %	onte	Liquid Limit	Plastic Limit
l the	mple	og	Shelby Tube		000	8	enet	3rav	San	and	ŭ	quid	astic
ľ	Sal	Sym	Rock Core		&		980	`		Si Si	Nate		ā.
			MATERIAL DES	CRIPTION			_				1		
		· · · · · · · · · · · · · · · · · · ·	Brown <u>CLAYEY SAND</u> with fragments, damp, medium d										
		a											
2.5		۰. ۵	9										
-35-		a			30								
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707		۵	- SPOIL/FI	LL -	58/3								
7 2/2													
		on Der		Remarks: Groundwa drilling operations.	iter wa	as fir	st noted	at a d	epth	of 67	ft. d	uring	3
S Dat		ing Sta ing Co	mpleted: 12/15/00	dining operations.									
Eng	gineer ject N	/Geolo	gist: JEN/CEM C00553						Col	ntinue	ed Ne	ext P	age

Pr	oject	Des		OF BORING No sylmpoundment invested to the sylmpoundment invested			<u> </u>		7		4	\[)
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing N Surface El.: 1051.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCR		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 65 - 			Brown <u>CLAYEY SAND</u> with sar fragments, damp, medium dens				4-5-8-6 3-6-7-5						
- 70 -			- with some plant roots at 69.0 f				1/12"-2-3				•		
	X		(69.0 - 71.0 ft.) - with coal slurry and sandstone (73.0 - 75.0 ft.)	e fragments		١	WOT/24" WOT/12"-4-2	?					
75 - 		a	- with numerous sandstone frag (77.0 - 79.0 ft.)	gments			11-12-10-16 15-10-6-6						
-80-		00					WOT/24"						
		a					40-20-14-10 3-8-6-9						
- 85 - 			- with trace slurry (85.0 - 91.0 f	ft.)		١	NOT/12"-5-2	2					
GPJ 2/28/01 - 06	X	a	- SPOIL/FILL				5-6-4-5						
Cooperation Cooper	te Boi te Boi	r/Geolo	arted: 12/14/00 completed: 12/15/00	Remarks: Groundwat drilling operations.	er w	as fir	st noted a	it a d		of 67 ntinu			

Pro	ojec	t Des			G OF BORIN Irry Impoundme Kentucky				3		3		4		
				: See Drawing					S				%		
#	je j	၂ လ	Surface I	El.: 1051.8 feet			%		che che	· o		% ~	ent 6	nit	Ξį.
, fe	e ک))	Split	t Spoon			ery	RQD	trati 6 in	(el %	у р	ဦ	onte	l Lin	C Lii
Depth, feet	Sample Type	loq	She	lby Tube			Recovery %	🔀	enel	Gravel %	Sand %	Silt and Clay %	er C	Liquid Limit	Plastic Limit
٥	Sa	Symbol / USCS	Roc	k Core			~ ×		Penetration Blows / 6 inches			Silt	Water Content %	٦	盃
		Ü		MATERIAL DES	CRIPTION				_				_		
	X	0 .	Brown Cl	_AYEY SAND with	sandstone	91.0		1.	WOT/18"-7						
			fragments dense	s, damp to wet, me	dium dense to very				50/2"						
L -			COAL			93.0	92	28							
L _			COAL			/									
		\leq	Gray CLA	AY SHALE, very so	very soft to soft, becoming hard with depth										
-95-		\leq	sandier a	nd medium hard wi	th depth										
		\leq													
		\leq													
		\leq													
		\leq													
		\leq					00	94							
100-		$\langle \rangle$					98	94							
		$\langle \rangle$													
L _		\leq													
ļ		\leq													
Ī -		\langle				103.9									
-		V V	Gray SAN	NDSTONE with sha	le laminations,	104.8								İ	
105-		Ť	medium l	hard, fine to mediur	n grained										
			В	Bottom of Test Borin	g @ 104.8 ft.										
-															
-															
110-															
-															
-			·												
-															
115-															
<u> </u>															
<u> </u>															
-	1														
120 - Cor	l npleti	ion De	pth: 1	04.8 feet	Remarks: Grou	ındwat	er w	as fir	st noted a	t a d	epth	of 67	ft. d	uring	
Dat Dat Eng	e Bor e Bor	ring Sta ring Co r/Geolo	arted: 1 ompleted: 1 ogist: J	2/14/00 2/15/00 EN/CEM :00553	drilling operati						-				

			Location: See Drawin	y, Kentucky g No. C00553-1				triadeng.com						
	ø	၂ ဗ္ဌ	Surface El.: 1051.2 fee	=		9		hes			%	Water Content %	يي	
teet	Typ)SN	Split Spoon			Recovery %	۵	ation	Gravel %	%	Slay	nter	Liquid Limit	
Depth, feet	ple	/ 0	Shelby Tube			Sove	RQD	netra s / 6	rave	Sand %	bu	ပိ	Ë	
De	Sample Type	Symbol / USCS	Rock Core			Re		Penetration Blows / 6 inches	၂	o,	Silt and Clay %	/atei	Lig	
		8	MATERIAL DE	SCRIPTION				ш			0,	>		
	P	\bigotimes	Coarse <u>COAL REFUSE</u>											
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20-		ο΄	Drawn CLAVEV CAND with	a aandatana										
_	Ь	a	Brown <u>CLAYEY SAND</u> with fragments, damp, medium											
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-	7	· · · a												
-		0	- SPOIL/	FILL -										
_	4		J. 3121	_										
30-		ان نا	pth: 104.8 feet	Remarks: Groui			ليبا	st noted	l					L

Pro	oject	Des		OG OF BORING durry Impoundment y, Kentucky			triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawin Surface El.: 1051.2 fe Split Spoon Shelby Tube Rock Core MATERIAL DI	et	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 35			Brown CLAYEY SAND with fragments, damp, medium	fill -									
Con Date Date Eng	e Bori e Bori	/Geolo	rted: 12/15/00 mpleted: 12/18/00	Remarks: Ground drilling operation		as firs	st noted a	it a d		of 65			

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet Split Spoon Shelby Tube		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Disetie Limit
۵	Sa	Syn	Rock Core MATERIAL DESCRIPTION		œ		Blo.		\$	Silt	Wat	L	٥
	1	· · · · · · · · · · · · · · · · · · ·	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense										
- - 65 -		a	- SPOIL/FILL -	65.0			27 50/5"						
1 1 1	$\langle \rangle$		Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, very dense	:			27-50/5"						
- 70 –				70.5		1	7-28-35-50/6) "					
1 1 1		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable		94	31	50/3"						
75 – –) // //		77,1									
- 30			VOID - void sample (79.7' - 82.7') brown silty sand			-							
-			0.1% gravel 93.9% sand 6.0% silt and clay										
- 85 -					33	23			,				
-													

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Dlactic I imit
			VOID COAL Gray CLAY SHALE, very soft to soft, becoming sandier and medium hard with depth	90.8									
95 -													
00-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> with shale laminations,	101.8	98	85							
- 05-		<i>Y Y Y Y Y Y Y Y Y Y</i>	medium hard, fine to medium grained Bottom of Test Boring @ 104.8 ft.	104.8									
10-													
1 1 1 1													
15-													

Location: See Drawing No. C00553-1 Surface El.: 1051.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION Source COAL REFUSE Surface El.: 1051.8 feet Split Spoon Coarse COAL REFUSE	Gravel %	Sand % Sift and Clay %	Water Content % Liquid Limit	Plastic Limit
MATERIAL DESCRIPTION Coarse COAL REFUSE 5.0	Gravel %	Sand % Sift and Clay %	Water Content %	Plastic Limit
MATERIAL DESCRIPTION Coarse COAL REFUSE 500	Gravel %	Sand %	Water Conte	Plastic Lin
MATERIAL DESCRIPTION Coarse COAL REFUSE 500	Grav	San San Sit and	Water Co	Plastic
MATERIAL DESCRIPTION Coarse COAL REFUSE 500		Silt	Wate	d
MATERIAL DESCRIPTION Coarse COAL REFUSE 500				
5.0		ı		
5.0				
Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense				
				127
- SPOIL/FILL -				
Completion Depth: 105.8 feet Date Boring Started: 12/18/00 Date Boring Completed: 12/19/00 Engineer/Geologist: JEN/CEM Project No.: C00553	ed at a dep	pth of 65	5 ft. durir	ng

Pr	ojec	t Des		G OF BORING N urry Impoundment Inv , Kentucky			3	L	7		4		
			Location: See Drawing	y No. C00553-1				,					
#	e e	SSS	Surface El.: 1051.8 fee	t	%		Penetration Blows / 6 inches			%	Water Content %	ij	별
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	ratic 6 inc	Gravel %	Sand %	Silt and Clay %	onte	Liquid Limit	Plastic Limit
epth	m M	loqi	Shelby Tube		000	M M	enet vs / (3ra	San	and	ر ت	quio	astic
	Sa	Syn	Rock Core		ď		Blov			ä	Nate	ij	面
			MATERIAL DES	SCRIPTION									
	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense												
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<u>-</u> -		a	- SPOIL/F	ILL -							l		
2/28/							l						
60 – 60 –										l			
Con Date Date	e Bor e Bor		arted: 12/18/00 mpleted: 12/19/00	Remarks: Groundwa t drilling operations.	ter wa	as firs	st noted a	t a d	epth	of 65	ft. d	uring	
Eng Pro	ineer ject N	/Geolo lo.:	C00553						Cor	ntinue	ed Ne	ext Pa	age

et	ype	SCS	Location: See Drawing No. C00553-1 Surface El.: 1051.8 feet		% '		Penetration Blows / 6 inches	%	.0	% /t	Water Content %	ŧ	mit
Depth, feet	Sample Type	Symbol / USCS	Split Spoon Shelby Tube		Recovery %	Rab	etrati / 6 in	Gravel %	Sand %	Silt and Clay %	Conte	Liquid Limit	Plastic Limit
Dep	Sam	ymk	Rock Core		Rec	"	Pen lows	ő	SS	iltan	ater	Liqu	Plas
		0	MATERIAL DESCRIPTION				Ω.			"	3		
-	1	a	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense										
-	I	0	- SPOIL/FILL -										
	I	a		65.0									
65 –			Brown CLAYEY SAND to SANDY CLAY with	00.0									
	\triangle	<u> </u>	some sandstone fragments, damp, very dense										
	X	[:::]	- boulder at 67.9 ft.										
				69.3	:								
70 -		/	Descript CANDCTONE and divine head and divine to	09.5	69	0							
		//	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable										
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-		//	- weathered, clayey, very soft (81.1 - 81.9 ft.)										
_		\angle	,,,,									ĺ	
80 –		\times											
-													
-				81.9									
-		\langle	Gray <u>SHALE</u> , soft										
-		$\langle \rangle$		84.9					ł				
5-			COAL	04.8		,							
-			COAL		99	12							
-													

Pro	oject	t Des		G OF BORING urry Impoundment , Kentucky			3		7	}	4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	i e	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray CLAYEY SHALE, very becoming sandier and media - core loss (100.8' - 105.8') of barrel malfunction	soft to soft, um hard with depth	93.5	60							
 		\sim	- sandstone @ 105.8 ft.	1	05.8	0							
110-			Bottom of Test Borin	g @ 105.8 ft.									
Date Date Eng	Bori Bori	/Geolo	nted: 12/18/00 mpleted: 12/19/00	Remarks: Ground drilling operation	dwater w	/as fir	st noted a	at a d	epth	of 65	ft. d	uring	-

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve Kentucky			triadeng.com		3	}	4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		on Det		LL - Remarks: Groundwat	er w	as fir	st noted a	ıt a d	epth	of 77	ft. d	uring	
Date Date Eng	e Bor e Bor	ing Sta ing Co /Geolo	rted: 12/19/00 mpleted: 12/19/00	drilling operations.						ntinue			

Location: See Drawing No. C00553-1 Surface EI.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense	Silt and Clay % Water Content % Liquid Limit
MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense - 35 -	Silt and Clay % Water Content % Liquid Limit
MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense - 35 -	Sitt and Cla Water Conte
MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense - 35 -	Silt and Water Co Liquid
MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense - 35 -	Sit
MATERIAL DESCRIPTION Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense -3535404536454545454545454	
Brown CLAYEY SAND with sandstone fragments, damp, medium dense to very dense	
-55-	
SPOIL/FILL -	
Remarks: Groundwater was first noted at a depth	of 77 ft. during
Completion Depth: 101.4 feet Date Boring Started: 12/19/00 Date Boring Completed: 12/19/00 Engineer/Geologist: JEN/JTS Project No.: Co0553 Completion Depth: 101.4 feet drilling operations. Remarks: Groundwater was first noted at a depth drilling operations.	

Pr	ojec	t Des	LOG OF BORIN cription: Big Branch Slurry Impoundment Martin County, Kentucky				<u> </u>		7	}	A	\[
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 65			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense - SPOIL/FILL -	65.0									
	X		Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, dense to very dense - with some coal fragments and organics (69.0 - 71.5 ft.)				19-32-24-27 14-27-30-31						
- 70 - 			- boulder at 71.5 ft with some gray mottling (73.0 - 75.0 ft.)				10-24-25-30 30-50/2" 19-28-28-19						
- 75 - 			- wet (77.0 - 79.0 ft.)				24-21-22-23 15-16-15-15						
- 80 - 			- sampler advanced from weight of tools (79.0 - 80.5 ft.) Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable	80.5 82.5			wot/18" 2-33-48-38						
 - 85 -			COAL			2	5-50/6"-50/2	11					
		ion Dej			100 ter w	0 as fir	est noted a	t a d	epth	of 77	ft. d	uring	
English	te Boi	r/Geolo	mpleted: 12/19/00							ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des	•	G OF BORII urry Impoundme v, Kentucky				7 - 7 triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1052.4 fee Split Spoon Shelby Tube Rock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			COAL		01.6									
 		$\mathbb{W}\mathbb{W}$	Gray <u>SHALE</u> , soft to mediu - clayey, soft (91.6 - 94.3 ft		91.6									
-95- 		W\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- silty medium hard (94.3 - Gray <u>SANDSTONE</u> with sh medium hard, fine to mediu	ale laminations,	95.5	100	87							
100-													·	
		<i>×</i> ⁄		0.404.45	101.4									
 105 - 			Bottom of Test Bori	ng @ 101.4 it.										
110-							# 12 # 12 41 11 41 22							
-115 							.02.0							
420														
Date Date Eng	e Bor e Bor	/Geolo	arted: 12/19/00 mpleted: 12/19/00	Remarks: Grou drilling operat		er wa	as fir	st noted a	at a d	epth	of 77	ft. d	uring	

Pi	ojec	t Desc		G OF BORING N urry Impoundment Inve , Kentucky			triadeng.com	L	7		4		
			Location: See Drawing	y No. C00553-1							_		
یا ا	l e	ဗ္ဗ	Surface El.: 1051.4 feet	t	%		n hes			%	nt %	يب	ا پر
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	Q	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
ag g	ηple	og	Shelby Tube		000	ROD	eneti	Srav	San	and	ပိ	pinb	astic
ے ا	Sar	l g	Rock Core		8		Pe Slow			Sit	Vate	Ë	ă
			MATERIAL DES	SCRIPTION			ш				^		
- 10 15 20 25 25-			Brown CLAYEY SAND with fragments, damp to wet, verdense	25.0 sandstone y loose to medium									
127/01		. °	- SPOIL/FI	LL -									
20-30-		0											
Co Da Da En	e Boi le Boi	r/Geolo	rted: 12/19/00 mpleted: 12/19/00	Remarks: Groundwat drilling operations.	er wa	as fir:	st noted a	ıt a d		of 65			

Pr	oject	Des	cription: Big Branch	OG OF BORING Slurry Impoundment ty, Kentucky			<u> </u>	L	4		4		
			Location: See Drawi	ng No. C00553-1									
#	8	Symbol / USCS	Surface El.: 1051.4 fe	et	%		L Ses			Silt and Clay %	 	≠	ij
Ţ.	Ţ	SO	Split Spoon		ery	Rob	ratic 3 inc	% 	% p	Cla	oute	Ë	Ë
Depth, feet	Sample Type	log	Shelby Tube		Recovery %	&	enet	Gravel %	Sand %	and	ŭ m	Liquid Limit	Plastic Limit
	Sa	Sym	Rock Core		%		Penetration Blows / 6 inches	~		Si.	Water Content %	<u> </u>	ā
			MATERIAL D	ESCRIPTION							_		
		a	Brown <u>CLAYEY SAND</u> wi fragments, damp to wet, v dense										
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-60-						Ll		L					
Con Date	e Bori	on Dep ng Sta ng Coi		Remarks: Ground drilling operation		as fir	st noted a	it a d	epth	of 65	ft. d	uring	
Eng		Geolo							Cor	ntinue	ed Ne	xt P	age

Pro	oject	Des	LOG OF BORING cription: Big Branch Slurry Impoundment In Martin County, Kentucky			3	L	7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, very loose to medium dense									
 			 with trace coal fragments (67.0 - 69.0 ft.) with trace root fragments (69.0 - 71.0 ft.) 			16-6-6-4 wot/12"-4-4						
70 	X		- with trace root fragments (00.0 - 71.0 ft.)			12-6-4-6						
- 75 - 75 	X					5-5-5-7						
 - 80 - 			- with some slurry and weathered coal fragments (81.0 - 83.0 ft.)			27-50/2" 17-12-10-11						
 - 85 -		3	- with numerous sandstone fragments			7-8-9-13 wot/18"-5						
2/28/01			(85.0 - 87.0 ft.) - with some weathered coal and shale fragments at 88.5 ft. - SPOIL/FILL -			4-6-7-6 wot/24"						
Dat Dat Eng	e Bor e Bor	/Geolo	arted: 12/19/00 drilling operations mpleted: 12/19/00	vater w	as fir	st noted a	t a d		of 65			

Pro	ojec	t Des		LOG OF BORI ch Slurry Impoundm ounty, Kentucky				triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Surface El.: 1051 Split Spoon Shelby Tube Rock Core	awing No. C00553-1 .4 feet AL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		\mathcal{M}	COAL Gray CLAYEY SHAL	<u>E</u> , very soft to soft,	93.0			50/3"						
-95- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	becoming sandier wi			91	51							
 100 -		\bigvee	- very sandy (99.0 - Bottom of Te	st Boring @ 100.0 ft.	100.0									
													i di	
110 - 														
115									·				24.	
GP 120-														
Cor Dat Dat Eng	e Boi e Boi	r/Geolo	arted: 12/19/00 impleted: 12/19/00	Remarks: Gro drilling opera	undwat tions.	er w	as fir	st noted a	it a d	epth	of 65	ft. d	uring	

Pro	ojec	t Des		G OF BORING N urry Impoundment Inve , Kentucky			triadeng.com	Ī	7		4		
			Location: See Drawing	y No. C00553-1									
	e	SSS	Surface El.: 1052.0 feet	t	%		Penetration Blows / 6 inches			% /	Water Content %	iţ	¥
Depth, feet	Sample Type	Symbol / USCS	Split Spoon		Recovery %	RQD	ratio S inc	Gravel %	Sand %	Silt and Clay	onte	Liquid Limit	Plastic Limit
epth	mple	loqi	Shelby Tube		000	2	enet	Srav	San	and	r. C	quid	astic
	Sa	Syn	Rock Core		ď		Blow			Sit	Nate	-	ā
			MATERIAL DES	SCRIPTION									
- 10			Coarse COAL REFUSE Brown and gray CLAYEY Sy fragments, damp	15.0									
-25-		a											
-		0'.					·						
<u> </u>	4	a											
		a											
127/01		0	- SPOIL/FI	ILL -									
20-30-		a											
Con Date Date Eng	e Bor e Bor	/Geolo	rted: 12/20/00 mpleted: 12/20/00	Remarks: Groundwat drilling operations.	ter wa	as fir	st noted a	t a d		of 60 ntinue			

Pro	ojec	Des		LOG OF BORI nch Slurry Impoundme County, Kentucky			ų	L	7		1		
Depth, feet	Sample Type	Symbol / USCS	Surface El.: 1052 Split Spoon Shelby Tube Rock Core	rawing No. C00553-1 2.0 feet IAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-35 - -40 - -45 - -50 -			Brown CLAYEY SAI fragments, damp	ND with sandstone									
55 -			- wet @ 60 ft. - S	POIL/FILL -									
Date Date Engi	Borii Borii	Geolog	rted: 12/20/00 npleted: 12/20/00	Remarks: Grou drilling operati	indwater wa	s firs	st noted a	t a de		of 60			

Proj	ject	Desc	LOG OF BORI cription: Big Branch Slurry Impoundme Martin County, Kentucky				<u> </u>		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.0 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
-75-			Brown and gray CLAYEY SAND with some sandstone fragments, damp, - SPOIL/FILL - Brown CLAYEY SAND to SANDY CLAY with little sandstone fragments, damp, very dense - boulders @ 67 ft. and 69 ft. Brown SANDSTONE, medium hard, medium grained, weathered and friable - diagonal fracture (71.3' - 71.7') - vertical fracture (73.7' - 74.0') and 79.2' - 79.5')	70.6	89	43	20-30-50/5" 49-50/4" 50/6"						
80 – 80 –			- shale band (81.8' - 83.0')									:	
 - 85 - 			COAL	83.0	96	18							
Date I	Borii Borii neer/	Geolog	rted: 12/20/00 drilling operat		er wa	as fir	st noted a	t a d		of 60		_	

Pro	ojec	t Des		ranch Sl	G OF BOR urry Impoundn , Kentucky				<u> </u>	Ī	7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Surface El.: 10 Split Spoon Shelby Tube Rock Core MAT)52.0 fee			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 95 - 					ft to soft, becomin ith increasing dept		97	54					-		
100 - 105 - 		WWWWW\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTOR</u> medium hard, fin	e to mediur	ale laminations, m grained ng @ 105.0 ft.	103.9	100	96							
410-			Bottom	1 (63) 35/11	ig (g) 100.0 it.										
115 1 1 1 1 1 1 1 1 1															
Date Date Eng	e Bor e Bor	/Geolo	rted: 12/20/00 mpleted: 12/20/00))	Remarks: Gre drilling opera		er wa	as fir	st noted a	at a d	epth	of 60	ft. d	uring	!

F	>rc	ojec	t Des	LOG OF I cription: Big Branch Slurry Imp Martin County, Kentuc	BORING NO coundment Inve			٠,		7		4		
				Location: See Drawing No. C0	0553-1									
ł		ø.	တ္က	Surface El.: 1055.3 feet				ies			%	t %		
Denth feet		Sample Type	Symbol / USCS	Split Spoon		Recovery %		Penetration Blows / 6 inches	%	8	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
۽		ble	<u>ੇ</u>	Shelby Tube		ove.	RQD	netra 76	Gravel %	Sand %	D Pu	Cor	l pir	stic
ا و	<u>.</u>	sam	튙	Rock Core		Rec		Per ows	ō	S	iltaı	ater	Liqu	Plas
-		0,	Ś	MATERIAL DESCRIPTIO	N			<u> </u>			S	>		
<u> </u>				WATERIAE DEGORITO										
-	-	7	$\langle \rangle \rangle$	Coarse COAL REFUSE	1.5		1415.4 1415. 1415.			,				
-	-	4	0 .	Drawn Cl AVEV CAND with condition										
L			a	Brown <u>CLAYEY SAND</u> with sandston fragments, damp	e									
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5	7			- SPOIL/FILL -										
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30	<u>5</u>	anlet:	on Dep	oth: 106.7 feet Remark	e.				L			l	l	
			ing Sta	rted: 12/20/00	J .									
	ate	e Bor	ing Co	mpleted: 12/20/00										
		ineer ect N	/Geolo lo.:	gist: JEN/JTS C00553						Cor	ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des	cription: Big Branch Slurry Impoundment Martin County, Kentucky				3	L	7		4	\[
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.3 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 40			Brown CLAYEY SAND with sandstone fragments, damp - SPOIL/FILL - Brown SANDY CLAY to CLAYEY SAND with some sandstone fragments, damp, medium dense to very dense Brown SANDSTONE, medium hard, medium grained, weathered and friable - medium hard (54.4 - 57.8 ft.) - gray, medium hard to hard from approximately 56 ft.	50.9	100	3	8-5-6-11 23-14-30-41 8-34-42-55/\$ 30-65-60-69 23-33-50/5"	=					
Eng	e Bor e Bor	/Geolo	nted: 12/20/00 mpleted: 12/20/00							ntinue	ed Ne	ext Pa	age

Pr	ojec	t Des		G OF BORING N urry Impoundment Inv			<u> </u>		7	}	A	\-	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1055.3 fee Split Spoon Shelby Tube Rock Core MATERIAL DES	g No. C00553-1 t	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 65		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> , mediur medium grained - with occasional carbonace (61.1 - 62.2 ft.) - iron stained, weathered, m (62.2 - 62.4 ft.)	ous laminations									
			- iron stained (62.9 - 65.5 ft		100	81							
- 70 - 			- with occasional coal spars - fractured (76.4 - 76.7 ft.)										
-75- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron stained (80.3 - 84.7 ft	.)	100	92							
- 80 - 													
- 85		\	VOID (Partially F	84.7 	32	29							
Date Date	Bor Bor	/Geolo	arted: 12/20/00 mpleted: 12/20/00	Remarks:					Cor	ntinue	ed Ne	ext Pa	age

			Martin County, Kentucky		Ι		triadeng.com					
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.3 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit
_			VOID									
			(Partially Filled)									
-95- 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SHALE</u> , soft to medium hard - clayey, soft (95.1 - 97.6 ft.) - silty, medium hard (97.6 - 98.1 ft.) - sandstone lens, medium hard (98.1 - 98.7 ft.)	95.1	61	5						
 105 - 			- silty, medium hard (98.7 - 102.4 ft.) Gray <u>SANDSTONE</u> , medium hard to hard, fine grained	102.4	98	98						
110-			Bottom of Test Boring @ 106.7 ft.		i Promision (Promision) (Promi							
120 L Comp Date I Date I Engin Projec	3ori 3ori eer/	ng Sta ng Co Geolo	arted: 12/20/00 mpleted: 12/20/00	I		L	<u>I</u>					

Pr	ojec	t Des		G OF BORING N urry Impoundment In , Kentucky			Ψ.		7		4		
			Location: See Drawing								\0		
et	/be	Symbol / USCS	Surface El.: 1054.5 feet	t	%		Penetration Blows / 6 inches			Silt and Clay %	Water Content %	ŧ	ij
Depth, feet	Sample Type	ň/	Split Spoon		Recovery %	RQD	trati 6 in	Gravel %	Sand %	S .	onte	Liquid Limit	Plastic Limit
eptl	ımpl	loqu	Shelby Tube		eco	Ϋ́	ene //s//	Gra	Sar	anc	er C	iquic	lasti
	Se	Syr	Rock Core		R		Blo			Sil	Wat	7	۵
			MATERIAL DES	SCRIPTION									
	1	0.00	Brown <u>CLAYEY SAND TO S</u> sandstone fragments, damp	SANDY CLAY with									
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ලි Date	e Bori	on Dep ing Sta	arted: 12/20/00	Remarks:									
Date	e Bori	ing Co	mpleted: 12/21/00										
Proj	ineer ect N	/Geolo lo.:	C00553						Cor	ntinue	ed Ne	ext Pa	age

Р	roje	ct Des		G OF BORIN urry Impoundme , Kentucky				ų,		7	}	4	\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1054.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	i		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 40 - 45 - 50			Brown <u>CLAYEY SAND TO S</u> sandstone fragments, damp											
			Brown <u>SANDSTONE</u> , mediu grained, weathered and friab	le	52.0							5		
- 55			- soft to medium hard (52.0	- 56.5 ft.)										
-		<i>Y</i> ////////////////////////////////////	- with occasional clay lenses (56.7 - 57.2 ft.)	, soft										
iPJ 2/27/0;		\\\ \\\\	- fractured (57.5 - 57.7 ft.)			81	50							
Da Da En	te Bo	er/Geolo	nted: 12/20/00 mpleted: 12/21/00	Remarks:		•			•	Cor	ntinue	ed Ne	ext Pa	age

	 m	် လ	Location: See Drawing No. C00553-1 Surface El.: 1054.5 feet				_ se			%	, t		
Depth, feet	Sample Type	Symbol / USCS	Split Spoon	Recovery %			Penetration Blows / 6 inches	%	%	Silt and Clay %	Water Content %	Liquid Limit	
pth,	nple	/ log	Shelby Tube	9		RQD	netra s / 6	Gravel %	Sand %	Dug.	Ş	l pini	
۵	San	Sym	Rock Core	a a	!		Pe 3low	o O	"	Silt	Vate	Ë	8
			MATERIAL DESCRIPTION								۸		
			Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable										
_			- gray (66.3 - 66.9 ft.)										
- 65 -		//	- gray shale lens (66.1 - 66.3 ft.)							,			
-		//		99	,	89							
_													
		× × ×	- gray, medium hard to hard from 69 ft.										
70 -		××/											
_		<i></i>			+								
-		\ <u>\</u>	- with occasional coal spars (72.9 - 78.8 ft.)										
_													
75 –		×/											
_		//		99	۱ ا	94							
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-		<u> </u>											
_				90		75							
85 –		//		85.7									
_		M	Cray SHALE goff to madium hard	87.1	+								
-			COAL	100		0							
_					+								

Pro	ojec	t Des	cription: Big Branch Slurry Impoundment In Martin County, Kentucky			<u>.</u>		3		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			COAL	100	0							
	;		- poor recovery due to inner barrel malfunction (91.3 - 97.0 ft.)	20								
-95-				32	0							
<u> </u>		\wedge	96. Gray <u>SHALE</u> , soft to medium hard	3								
		WWW	- clayey, soft (96.3 - 98.5 ft.)									
100 <i>-</i> 		\sim	- silty, medium hard (98.5 - 105.5 ft.)	99	99							
105		WWW.	105.	7								
-		\checkmark	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	3/								
-			Bottom of Test Boring @ 106.3 ft.									
H10-											3	
415 -				. %.441								
2/27/01												
75 120 -	am ! = !'	07.5	oth: 106.3 feet Remarks:	<u> </u>								
Date Date	e Bor e Bor	r/Geold	arted: 12/20/00 mpleted: 12/21/00									

Pro	oject	: Des		G OF BORING lurry Impoundment y, Kentucky			3		7		4		
			Location: See Drawin	g No. C00553-1									
	e e	છ	Surface El.: 1051.5 fee	et	%		Penetration Blows / 6 inches			% >	Water Content %	±	<u> </u>
fee	Tyr	SD.	Split Spoon		ery	۵	ratio S inc	% 	8	Clay	l fe	Li	Lin
Depth, feet	Sample Type	pol /	Shelby Tube		Recovery %	R G G	eneti	Gravel %	Sand %	Silt and Clay %	Ö	Liquid Limit	Plastic Limit
ے ا	Sar	Symbol / USCS	Rock Core		&		9 % 8 %			Sit	Vate	ا ت	ä
			MATERIAL DE	SCRIPTION			_	į			_		
- 5			Coarse COAL REFUSE										
 -20 - 	}												
- 25					V V								
Dat Dat Eng	e Boi e Boi	/Geolo	arted: 1/4/01 mpleted: 1/4/01	Remarks: Groun drilling operatio		as fir	st noted a	at a d				urinç ext P	

Pro	ojec	Des		OF BORING N urry Impoundment Inv Kentucky			۳,		7		1	\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1051.5 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		on Deg		LL - Remarks: Groundwa	ter w		11-27-16-10 woh/18"-5 3-5-10-9 8-14-20-13 9-9-11-26 st noted a	t a d	epth	of 60	ft. d	uring	
Eng	e Bor e Bor	ing Sta ing Co /Geolo	rted: 1/4/01 mpleted: 1/4/01	drilling operations.						ntinue			

	- 1		martin County, Kentucky			(-12 mood						
			Location: See Drawing No. C00553-1			s				%		
គ	ype	Symbol / USCS	Surface El.: 1051.5 feet	%		Penetration Blows / 6 inches	<u>_</u>	٠	3y %	Water Content %	Ħ	
n, Te	le T	0 /	Split Spoon	Very	Rg	trati 6 in	Gravel %	Sand %	Ö	ont	֡֝֟֝֟֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	
Deptn, reet	Sample Type	줱	Shelby Tube	Recovery %	ı œ	ene ws /	Gra	Sar	Silt and Clay	o i	Liquid Limit	
ב	S	Syn	Rock Core	۳ ا		Bon			iš	Wat	-	
		, <u>,</u>	MATERIAL DESCRIPTION									
	X	οα	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very dense			4-25-20-15			·			
-	M	۵	- SPOIL/FILL -			18-11-23-19						
- 5-		a	- shelby tube (66.0' - 67.0') - interface between fill material and natural ground			20-35-44-47						
`_		α										
	X	· · ·	66	90								
_		[:-:]	Brown CLAYEY SAND TO SANDY CLAY with									
-	Y	_÷:	some sandstone fragments, damp, very dense - shelby tube (68.0' - 69.0') brown clayey sand				13	45	42			
_		· · · · ·	to sandy clay with some sandstone fragments									
0-		-:	- shelby tube (72.0' - 72.8') brown clayey sand									
_	X		to sandy clay with sandstone fragments			11-17-27-42						
_												
	X			100								
		·: -: ::										
5-	X		- gray at 74.0 ft.		2	9-41-48-50/5	5"					
-			- brown at 78.0 ft.			31-26-46-48						
-	X					51-20-40-40						
_			- shelby tube (80.0' - 80.5')			20-22-27-36						
0-	\mathbf{X}		- weathered shale at 82.0 ft.	60								
-		. .										
	X		82	.5		21-50/5"						
_			COAL									
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90 -	aplati	on Don	th: 100.0 feet Remarks: Groundy	rater w	as fir	st noted a	t a d	enth	of 60	ff d	uring	
		on Dep ng Sta		atei W	uə III	ot noteu a	. a u	chui	J1 00	1 u	411116	•

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			Location: See Drawing					(n			_	%		
eţ	/pe	SSS	Surface El.: 1051.5 feet			%		che	9		ay %	ent 9	njt.	ij
Depth, feet	Sample Type	Symbol / USCS	Split Spoon			Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
Sept	amp	oqu	Shelby Tube			Seco	æ	ene ws/	Gra	Sal	t and	ter C	iqui-	last
	ίχ	Syl	Rock Core			I.E.		8 8			Sil	Wa		۳.
			MATERIAL DES	CRIPTION					ļ					
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					92.3									
		\wedge	O OLAY CHALE											
		$\langle \rangle$	Gray <u>CLAY SHALE</u> , very sof	τ το soπ							İ			
		\langle	-becomes sandier and medic	ım hard with depth										
-95-		$\langle \rangle$				100	65							
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		on De		Remarks: Groun	ndwat	er wa	as fir	st noted a	at a d	epth	of 60	ft. d	uring]
Date	e Bor	ing Sta ing Co	mpleted: 1/4/01	drilling operation	ons.									
Eng	ineei ject N	/Geolo	gist: JEN/CEM C00553											

Pr	ojec	t Des	cription:		urry Impou				Ψ.	L	7		Δ		
1			Location	on: See Drawing	y No. C0055	53-1									
#	be	Symbol / USCS	Surfac	e El.: 1051.1 fee	t		%		Penetration Blows / 6 inches			%	Water Content %	. <u></u>	# <u></u>
a a	T,	sn/	\boxtimes s	Split Spoon			ery	۾	ratio	% 	% P	Clay	ute	Ë	F.
Depth, feet	Sample Type	log	X s	helby Tube			Recovery %	RQD	eneti 's / 6	Gravel %	Sand %	Silt and Clay %	ပို	Liquid Limit	Plastic Limit
۵	Sal	Sym	R	Rock Core			%		30 P			Silt	Vate	Ĕ	풉
				MATERIAL DE	SCRIPTION								>		
	1	WW	Coarse	e COAL REFUSE											11:
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Eng	ineer	/Geolo		JEN/CEM							Car	ation	~ A NI-	.v.4	
Proj	ect N	o.:		C00553							COL	ntinue	<i>u 1</i> 16	XL Pa	aye I

Location: See Drawing No. C00553-1 Surface El:: 1051.1 feet Surface El:	Pro	ojec	t Desc	cription:		G OF BC urry Impou v, Kentucky	ndment Inv			triadeng.com	Ī	3		4		
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Coarse COAL REFUSE Coarse COAL REFUSE Coarse COAL REFUSE 40 - 40 - 40 - 40 - 40 - 40 - 40 - 40	pt,	nple						000	8	snetr s / 6	rave	Sanc	ğ	ပို	pinţ	stic
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-45 - 45 - 45 - 45 - 45 - 45 - 45 - 45					MATERIAL DE	SCRIPTION				ш				>		
-45555550 -		}		Coars	e <u>COAL REFUSE</u>											
-455560 Completion Depth: 105.5 feet 12/21/100 Date Boring Completed: 12/21/100 Indian Started: 12/21/100 Indian Started: 12/21/100 Indian Started: 13/21/200 Indian S	 -35-	}														
-455560 Completion Depth: 105.5 feet 12/21/100 Date Boring Completed: 12/21/100 Indian Started: 12/21/100 Indian Started: 12/21/100 Indian Started: 13/21/200 Indian S		}														
-55 - Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.		3														
-505560 Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JENI/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.	-40- 	1														
-505560 Completion Depth: 105.5 feet Date Boring Started: 1/2/1/100 Date Boring Completed: 1/3/01 Engineer/Geologist: JENI/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.		1														
-5560 Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.	 -45-	1														
-5560 Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.		{		-												
-5560 Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.		4														
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Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM 105.5 feet Completion Depth: 105.5 feet Com																į
Completion Depth: 105.5 feet Date Boring Started: 12/21/00 Date Boring Completed: 1/3/01 Engineer/Geologist: JEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.	-60-					1										
	Con Date Date Eng	e Bor e Bor	ing Sta ing Cor	rted: npleted:	12/21/00 1/3/01 JEN/CEM			ter wa	as firs	st noted a	at a d					

Project D	escription: Big Branch Slo Martin County	T			9		3				
Sample Type	Surface El.: 1051.1 feet Surface El.: 1051.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	Brown <u>CLAYEY SAND</u> with fragments, wet, medium der				17-17-9-12						
-65-	- with less clay and numerou fragments (64.0 - 66.0 ft.)	s sandstone			4-11-11-11 10-10-11-9 13-14-17-13						
70	- very wet at 70.0 ft.				10-8-8-11 OH/18"-14-	18					
-75	Brown <u>CLAYEY SAND TO S</u> some sandstone fragments, - shelby tube (74.0' - 75.0') a (76.0' - 77.3')	damp, very dense			19-20-15-31						
80					21-38-50/2" 38-41-43-48						
85 -	- shelby tube (84.0' - 86.0') with sandstone fragments	gray clayey sand			1-32-30-50/6 22-56-34-30	,,,,					
	- sandstone boulder at 89.0	ft.		-	27-57-50/3"						

Pro	ojec	t Des	cription: Big Branch	OG OF BORIN Slurry Impoundme ty, Kentucky				9.		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawi Surface El.: 1051.1 fe Split Spoon Shelby Tube Rock Core MATERIAL D	_		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Brown <u>CLAYEY SAND TO</u> some sandstone fragmen - sandstone boulder at 89	ts, damp, very dense	05.0	39	12	50-62-55-60						
			Gray <u>CLAY SHALE</u> , very sandier and medium hard	soft to soft, becoming with depth	95.6									
			Gray <u>SANDSTONE</u> with s medium hard, fine to med		102.0	100	94							
 			Bottom of Test Bo	oring @ 105.5 ft.										
115-														
Date Date	e Bor e Bor	/Geolo	rited: 12/21/00 mpleted: 1/3/01	Remarks: Grou drilling operati		er wa	as fir	st noted a	t a de	epth	of 60	ft. d	uring	

Pro	ojec	t Desc	cription:		G OF BORI urry Impoundm , Kentucky				triadeng.com		3		4		
Depth, feet	Sample Type	Symbol / USCS	Surface s	on: See Drawing e El.: 1054.4 fee plit Spoon thelby Tube tock Core MATERIAL DE	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	}		Brown	e <u>COAL REFUSE</u> <u>CLAYEY SAND</u> with ents, damp	sandstone	0.5									
- 5- - 5- 				AUGER W/OUT	SAMPLING										
 -10- 							:								
- 15 - - 15 - 		· · · · · · · · · · · · · · · · · · ·													
- 20 -															
- 25 -															
Date Date Eng	e Bor e Bor	/Geolo lo.:	rted: npleted:	102.4 feet 1/14/01 1/14/01 JEN/JTS C00553	Remarks:							ntinue	ed Ne		age

Pr	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve Martin County, Kentucky			<u> </u>		7				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 45			Brown CLAYEY SAND with sandstone fragments, damp AUGER W/OUT SAMPLING AUGER W/OUT SAMPLING 56.0 Brown SANDSTONE, medium hard, medium grained, weathered and friable									
Dat Dat	e Bor e Bor	on Dering Stating Co	arted: 1/14/01 Impleted: 1/14/01	L				Col	ntinue	ed Ne	ext P	

Pro	ojec	t Desc	LOG OF BORING N cription: Big Branch Slurry Impoundment Inv Martin County, Kentucky			3	L	3				
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable	100	30							
-65 - - 70 -			- gray, medium hard to hard from 65 ft.	100	92							
- 75 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- with occasional coal spars (75.2 - 76.0 ft.)									
80-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- iron-stained (77.8 - 80.2 ft.)	99	95							
- 85 -			84.3 COAL	98	44							
			- gray shale lens, soft(84.3 - 85.3 ft.)									
Date Date Eng	e Bor	/Geolo	rted: 1/14/01 mpleted: 1/14/01					Cor	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des	LOG OF BORING N cription: Big Branch Slurry Impoundment Inve			3.		7		4	\[
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			COAL - gray shale lens, soft (91.9 - 92.4 ft.)	100	0							
 95-		\mathcal{M}	94.3 Gray <u>SHALE</u> , soft to medium hard									
		$\wedge \wedge \wedge \wedge \wedge \wedge \wedge \wedge \wedge$	- clayey, soft (94.3 - 98.1 ft.)	98	65							
100-		WWW	- silty, medium hard (98.1 - 101.1 ft.)									
		\\\	Gray <u>SANDSTONE</u> , medium hard to hard, fine grained 102.4 ft.									
105-												
410-												
115 - 												
10027 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1												
Date Date Eng	e Bor e Bor	/Geolo	nted: 1/14/01 mpleted: 1/14/01									

Pro	oject	Des		G OF BORING lurry Impoundment y, Kentucky			triadeng.com		7		4)
			Location: See Drawin								, o		
	Be	Symbol / USCS	Surface El.: 1053.1 fee	et	%		Penetration Blows / 6 inches	٥	_	Silt and Clay %	Water Content %	⊭	nit It
Depth, feet	Sample Type	so	Split Spoon	•	Recovery %	RQD	tratic 6 in	Gravel %	Sand %	Sa	onte	Liquid Limit	Plastic Limit
epth	ďω	loq	Shelby Tube		000	Ä	enel vs /	Gra	San	and	i i	qui	asti
Ŏ	Sal	Sym	Rock Core		ď		Bo P	•		S≝	Nat		۵
			MATERIAL DE	ESCRIPTION									
			AUGER W/OUT	SAMPLING									
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 	1	XXXXXX											
- 10 - 	}	XXXXXX											
 -15-	ł	XXXXXXX											
 -20-	ŀ												
	}	XXXXX											
- 25 - 25	[
 	}												
Dat Dat Eng	te Boi te Boi	r/Geold	arted: 1/9/01 impleted: 1/9/01	Remarks: Water v	was note	d at a	depth of	 F 85 ff		n dri			Page

Pro	ojec	Des	cription:		OF BORING urry Impoundment In Kentucky			triadeng.com		3		4		
1			Location	on: See Drawing	No. C00553-1							٠,٥		
#	be	SSS	Surfac	e El.: 1053.1 feet		%		ches			У %	int %	it	풀
Depth, feet	Sample Type	sn/	\boxtimes s	Split Spoon		Recovery %	RQD	ratic 3 inc	Gravel %	Sand %	Silt and Clay %	onte	Liquid Limit	Plastic Limit
apth	nple	poq	 S	helby Tube		200	R	enet /s / (3rav	San	and	Ö	quid	astic
ă	Saı	Symbol / USCS	R	Rock Core		, a		Penetration Blows / 6 inches	~		Silt	Water Content %	Ĺ	죠
				MATERIAL DES	CRIPTION			_						
		IN THE PROPERTY OF THE PROPERT		AUGER W/OUT S	Remarks: Water wa	ıs noted	at at a	depth of	85 ft	. upo	n dri	lling		
Dat Dat Eng	e Bor e Bor	ing Sta ing Co /Geolo	rted: mpleted:	1/9/01 1/9/01 JEN/CEM C00553	completion.			•			ntinue		ovt D	200

Pro	ojec	t Des		OF BORING N rry Impoundment Inv Kentucky			triadeng.com		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1053.1 feet Split Spoon Shelby Tube Rock Core MATERIAL DES		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			AUGER W/OUT S	AMPLING									
 -75-	}		Gray <u>SANDSTONE</u> , hard, m	75.0									
 - 80 -			Gray <u>SANDS I GIVE,</u> Haid, Hi	edium gramed	98	98						,	
 - 85 - 		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		87.1									
PJ 2/28/01			VOID		46	44							
Dat Dat Eng	e Bo e Bo	r/Geolo	arted: 1/9/01 impleted: 1/9/01	Remarks: Water was completion.	note	d at a	depth of	85 ft		n dri		ext P	age'

Pro	ojec	t Des	cription:	LOC Big Branch Slu Martin County	G OF BORI urry Impoundm , Kentucky				triadeng.com		3		4	\[)
Depth, feet	Sample Type	Symbol / USCS	Surface Surface	on: See Drawing E El.: 1053.1 feet bolit Spoon nelby Tube bock Core MATERIAL DES	t		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
 - 95-				<u>VOID</u>											
 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		LAY SHALE, very so		97.1	98	46							
 				Bottom of Test Borin	ng @ 100.2 ft.	100.2									
 415 - 															
Dat Dat Eng	e Boi e Boi	r/Geold	arted: mpleted:	100.2 feet 1/9/01 1/9/01 JEN/CEM C00553	Remarks: Wa completion.	ter was	note	d at a	a depth of	85 ft	. upc	on dri	lling		

Pro	ojec	t Des	cription:		lurry Impo				triadeng.com		3		4		
				on: See Drawin	_	53-1			10			_	,o		
et	/pe	Symbol / USCS	Surfac	e El.: 1052.9 fe e	et		%		Penetration Blows / 6 inches	٠		Silt and Clay %	Water Content %	ij	nit
Depth, feet	Sample Type	'n/		Split Spoon			Recovery %	RQD	trati 6 in	Gravel %	Sand %	👸	onte	Liquid Limit	Plastic Limit
eptl	dme	loqu		Shelby Tube			(eco.	Ř	ene ws /	Gra	Sar	and	er C	iqui	lasti
	Ş	Syr		Rock Core			<u> </u>		B			≅	Waf		O.
			<u> </u>	MATERIAL DE	SCRIPTION										
	1	XX		AUGER W/OUT	SAMPLING										
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-30 - Con		on Dep		95.1 feet	Remarks:	Groundwat	er wa	as firs	st noted	at a d	epth	of 60	ft. d	uring]
Date Eng	e Bor ineer	/Geolo	mpleted:	1/10/01 1/10/01 JEN/CEM	drilling o	perations.					Cor	ntinu	ed Ne	ovt D	200
Proj	ect N	lo.:		C00553	<u> </u>	cation lines repre							JUIVE	<i>γ</i> , ι Γ (ay e

Location: See Drawing No. C00553-1 Surface El: 1052.9 feet Spin Spon Spin Spon Rock Core MATERIAL DESCRIPTION AUGER W/OUT SAMPLING Spin Spin Spin Spin Spin Spin Spin Spin	Pro	ojec	t Des	cription:						3		7		4		
AUGER W/OUT SAMPLING AUGUST SAMPLING AUGUST				Location	on: See Drawing	No. C00553	-1							.0		
AUGER W/OUT SAMPLING AUGUST SAMPLING AUGUST	#	e e	SSS	Surfac	e El.: 1052.9 feet	t		%		on Shes			× ×	nt %	ij	Ħ
AUGER W/OUT SAMPLING AUGUST SAMPLING AUGUST	, fee	7	sn /	\boxtimes s	Split Spoon			ery	Q	ratic 5 inc	e %	% p	Cla	onte	Lin	Ë
AUGER W/OUT SAMPLING AUGUST SAMPLING AUGUST	əpth	l gr	log		Shelby Tube			8	R	enet	Srav	San	and	C	quid	astic
AUGER W/OUT SAMPLING AUGUST SAMPLING AUGUST	ă	Sai	Sym	F	Rock Core			8		P, Blov	~		Silt	Vate		4
AUGER W/OUT SAMPLING AUGER W/OUT SAMPLING					MATERIAL DES	SCRIPTION								1		
Completion Depth: 95.1 feet Date Boring Started: 1/10/01 Date Boring Completed: 1/10/01 Engineer/Goologiet: IEN/CEM Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.	-40- -45- -50- -55-				AUGER W/OUT	SAMPLING										
Date Boring Started: 1/10/01 drilling operations. Date Boring Completed: 1/10/01 Engineer/Goologist: IFN/CFM	-60 - Con	nplet	on Der	oth:	95.1 feet	Remarks: C	Groundwat	er wa	as fir	st noted a	at a d	epth	of 60	ft. d	uring	
	Date Date	e Bor e Bor	ing Sta	rted: mpleted:	1/10/01 1/10/01											

		· · · · · · · · · · · · · · · · · · ·	Martin County, Kentucky	nt Inve	_		triadeng.com		1	/			
			Location: See Drawing No. C00553-1										
<u>,</u>	æ	Symbol / USCS	Surface El.: 1052.9 feet		%		Penetration Blows / 6 inches			Silt and Clay %	Water Content %	# <u></u>	
ē	Ţ	👸	Split Spoon		ery	Q	ratic S inc	% 	% p	Cla	onte	Ë.	:
Depth, feet	Sample Type	8	Shelby Tube		Recovery %	RQD	enet 's / (Gravel	Sand %	and	ñ	Liquid Limit	
۵	Sar	Ĕ	Rock Core		8		A Se		"	Sit	Vate	Ĕ	į
		"	MATERIAL DESCRIPTION				ш				>		
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		\bowtie											
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4	4	\lesssim	AUGER W/OUT SAMPLING			10.34							
35				65.0									ĺ
,,,		ľŽĪ	Gray <u>SANDSTONE</u> , medium hard to hard,			.							
-		\leq	medium grained										
_		<i>/</i> /	•		98	49							
_		/	- brown, weathered and friable		90	49							
		<u> </u>	(65.0' - 69.9')										
		/ <u>/</u> /	,										
70 –		\angle											
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		<i>×</i>			98	90							
-				83.2									
_		>	Gray <u>SHALE</u> , soft			j							
35 -				84.9									
			<u>COAL</u>										
-													
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90_													L
Com		ion Dep			er wa	as fir	st noted a	ıt a d	epth	of 60	ft. d	uring	j

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.9 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	imi I oitacia
			COAL	100	1							
_			94.1									
95 –		\sim	Gray <u>CLAY SHALE</u> , very soft 95.1									
-			Bottom of Test Boring @ 95.1 ft.									
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· · ·	7,00		Big Branch Slurry Impo Martin County, Kentuc	ky		triadeng.com						
		S	Location: See Drawing No. COC	553-1		S			<u>%</u>	%		
ğ	Sample Type	Symbol / USCS	Surface El.: 1056.7 feet	% 		Penetration Blows / 6 inches	%	8	Silt and Clay %	Water Content %	imit	:
آ	e T	=	Split Spoon)ver	RQD	etraf / 6 ii	Gravel %	Sand %	G G	Con	id	
Depth, feet	amb	g	Shelby Tube	Recovery %	u.	Pen	5	Sa	lt an	ter (Liquid Limit	١,
_	တ	ŝ	Rock Core			_ 8			S	Wa	_	١.
			MATERIAL DESCRIPTION									
	7	0	Coarse <u>COAL REFUSE</u>	0.5								
-		0	Brown CLAYEY SAND TO SANDY CL	AY with								
4		a	little sandstone fragments, damp, very	dense								
4	•	0										
5-		a										
١			AUGER W/0UT SAMPLING				Ì	1				
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			Martin County, Kentucky Location: See Drawing No. C00553-1			triadeng.com						
	ø		Surface El.: 1056.7 feet	 		hes			%	Water Content %	, <u>.</u>	٠,
	Sample Type	Sn	Split Spoon	Recovery %	۵	atio	Gravel %	Sand %	Cla	utei	Liquid Limit	timi I distrib
1	nple	/ 00	Shelby Tube	8	Rab	s / 6	ray	Sano	gug	ပို	quid	
	San	Symbol / USCS	Rock Core	8		Penetration Blows / 6 inches	"	"	Silt and Clay %	Vate	Ľ	ā
		"	MATERIAL DESCRIPTION			ш				>		
-	}		Brown <u>CLAYEY SAND TO SANDY CLAY</u> with little sandstone fragments, damp, very dense									
5 -			AUGER W/0UT SAMPLING									
	}				-							
) -	ŀ	a 										
` - -	ŀ	a										
	1		43.0	,								
1	P	/	Gray <u>SANDSTONE</u> , hard, fine to medium	A so								
1	4	//	grained									
5 🕇	Ь	<i>/</i> /	•	fig. 1								
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		//		75	53					.		
		<i>></i>									.	
- (1		- with numerous carbonaceous laminations									
-		` <i>`</i> `	(50.4 - 51.3 ft.)									
-		$^{\prime}/$	- iron stained, medium hard to hard	}								
-		Ž,	(51.5 - 52.0 ft.)									
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Pro	ojec	t Des	cription:	Big Branch	OG OF BORIN Slurry Impoundme nty, Kentucky			1	L	7	}	4		
Depth, feet	Sample Type	Symbol / USCS	Surfac S S	e El.: 1056.7 f plit Spoon helby Tube lock Core	ring No. C00553-1 feet DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 65			grainer - iron-s (61.4 - claye - diago	SANDSTONE, hard d stained, medium h 1 - 66.4 ft.) by shale lens, soft onal fracture (62.7	ard to hard (62.6 - 62.7 ft.) 7 - 62.9 ft.)	100	56							
-70 - 75 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		y shale lens, soft y shale lens, soft		100	100							
- 85 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				100	100							
Con Date Date Eng	e Bor e Bor	/Geolo	arted: mpleted:	101.1 feet 1/22/01 1/22/01 JEN/JTS C00553	Remarks:					Coi	ntinue	ed Ne	ext Pa	age

Pro	ojec	t Des	LOG OF BOR scription: Big Branch Slurry Impounds Martin County, Kentucky				3						
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.7 feet Split Spoon Shelby Tube Rock Core MATERIAL DESCRIPTION		Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Gray <u>SANDSTONE</u> , hard, fine to medium grained	91.1	86	57							
 - 95 - 			VOID - void sample (91.6' - 99.0') coal slurry with sa 0.7% gravel 22.2% sand 77.1% silt and clay	and									
 			Bottom of Test Boring @ 101.1 ft.	101.1									
 1 10-													
115-				:									
Date Date Eng	e Bor e Bor	/Geolo	arted: 1/22/01 ompleted: 1/22/01				i	<u> </u>	<u> </u>			<u> </u>	:

Depth, feet Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1		1					1		T
Depth, feet Sample Type	၂၂				Ø				ي		
Depth, fe		Surface El.: 1056.8 feet	%		e de			\%	aut %	ij	<u> </u>
Samp) <u> </u>	Split Spoon	Recovery %	Rab	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Dlactic I imit
رة ^ا	. oqu	Shelby Tube	l co	<u>~</u>	ene ws /	Gra	Sal	tand	ler O	ign	100
- 1	Syr	Rock Core	1 12		8			S	Wat		۵
		MATERIAL DESCRIPTION									_
	(a)	0. Coarse <u>COAL REFUSE</u>)								
-1	ο.	Brown CLAYEY SAND with sandstone fragments									
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-4	0										
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		CASING ADVANCE W/OUT SAMPLING									
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	9	Gray <u>SANDSTONE</u> , medium hard to hard	1								
	etion De oring Sta		note	d at a	depth of	85.2	ft. up	on d	rillin	g	

Pr	ojec	t Desc	cription: Big Branch	OG OF BORING Slurry Impoundment I nty, Kentucky			3		7		4		
Depth, feet	Sample Type	Symbol / USCS	Location: See Draw Surface El.: 1056.8 f Split Spoon Shelby Tube Rock Core MATERIAL	-	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray <u>SANDSTONE</u> , medium grained										
- 35 -			CASING ADVANCE	W/OUT SAMPLING				,					
- 40 - 		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
 -45-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
 - 50 -		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \											
- 55 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
Dat Dat Eng	e Bor e Bor	/Geolog	rted: 1/22/01 npleted: 1/23/01	Remarks: Water wa	as noted	l at a	depth of	85.2		oon d			age

Pro	oject [Description		OF BORING urry Impoundment In Kentucky			triadeng.com	L	3		4		
Depth, feet	Sample Type	Surfa	ion: See Drawing ce El.: 1056.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES	•	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
- 65		Gray	SANDSTONE, mediun	n hard to hard									
<u> </u>		Ž		87	.9								
			VOID			13 A							
Date Date Eng	e Boring e Boring	Depth: g Started: g Completed: eologist:	97.6 feet 1/22/01 1/23/01 JEN/JTS C00553	Remarks: Water was completion.	s note	d at a	depth of	f 85.2		oon d			age

Pro	oject	: Des		OF BORIN urry Impoundmer Kentucky				<u>.</u>		3		4	\	
Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing Surface El.: 1056.8 feet Split Spoon Shelby Tube Rock Core MATERIAL DES			Recovery %	RQD	Penetration Blows / 6 inches	· Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
100			VOID - no recovery (88.3' - 90.3') - silty sand and gravel (90.3' - silty sand w/trace gravel (90.3' - silty sand w/trace gravel (90.3' - 97.6') Bottom of Test Borid	2.3' - 94.3') 4.3' - 96.3')	97.6									
Date Date Eng	e Bor e Bor	/Geold	arted: 1/22/01 impleted: 1/23/01	Remarks: Water completion.	was ı	noted	data	depth of	85.2	ft. up	oon d	rillin	l g	

APPENDIX A LABORATORY TESTING

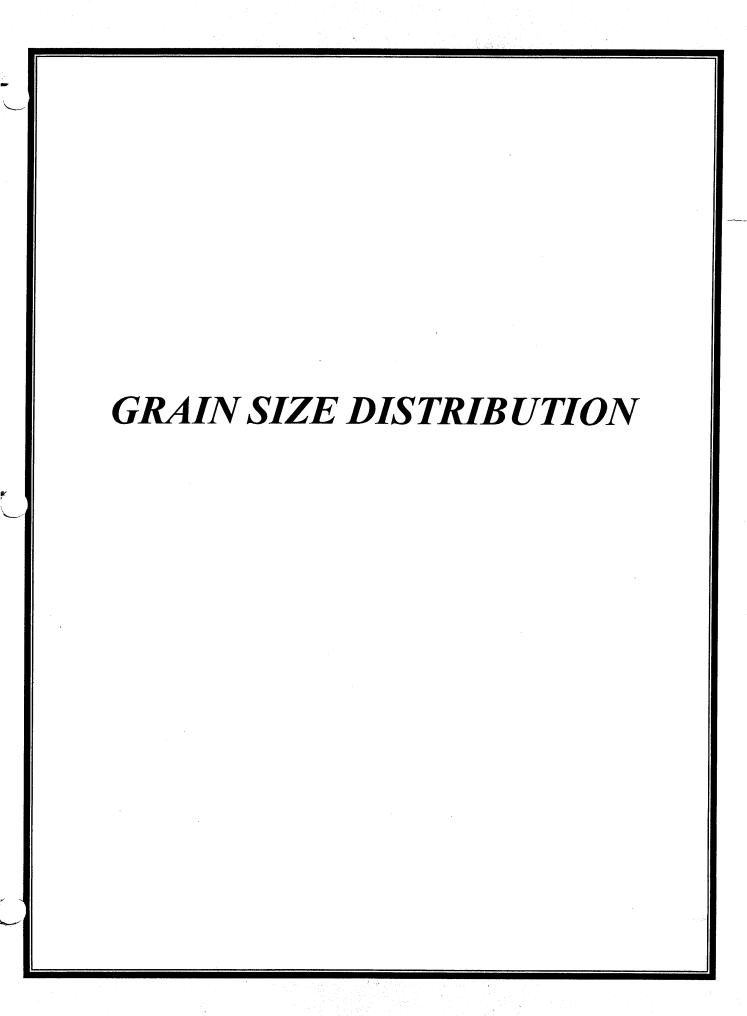
GRAIN SIZE DISTRIBUTION

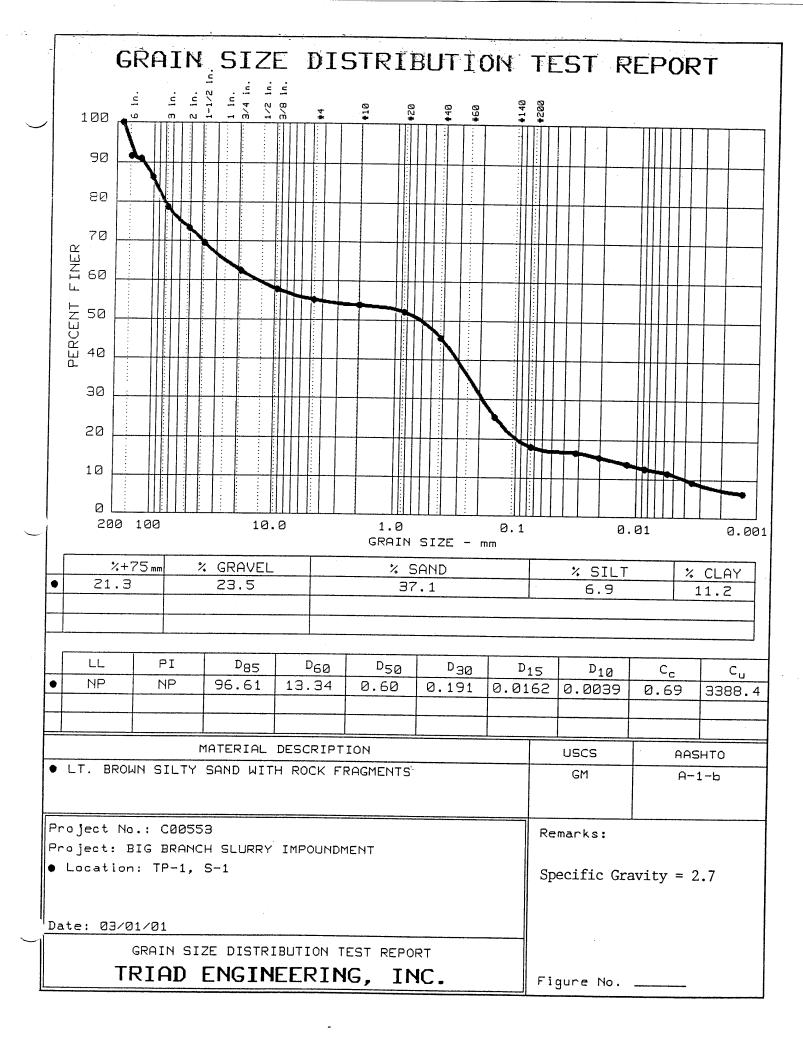
TRIAXIAL SHEAR STRENGTH

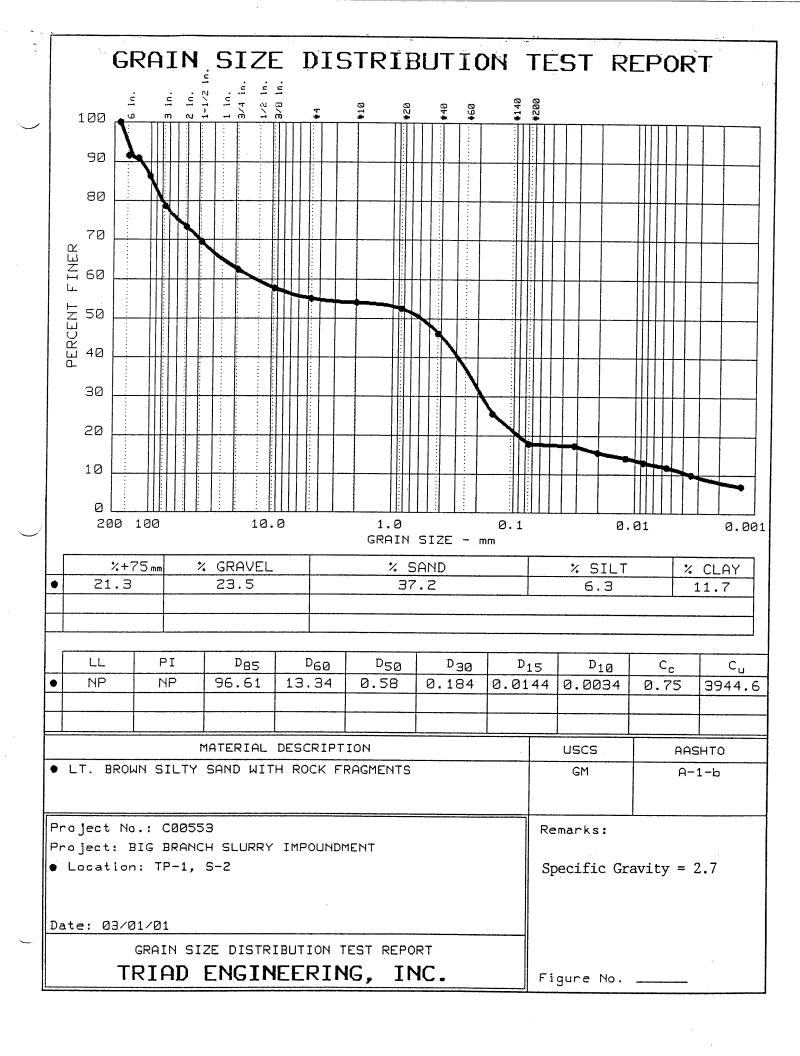
PERMEABILITY

UNIAXIAL COMPRESSIVE STRENGTH

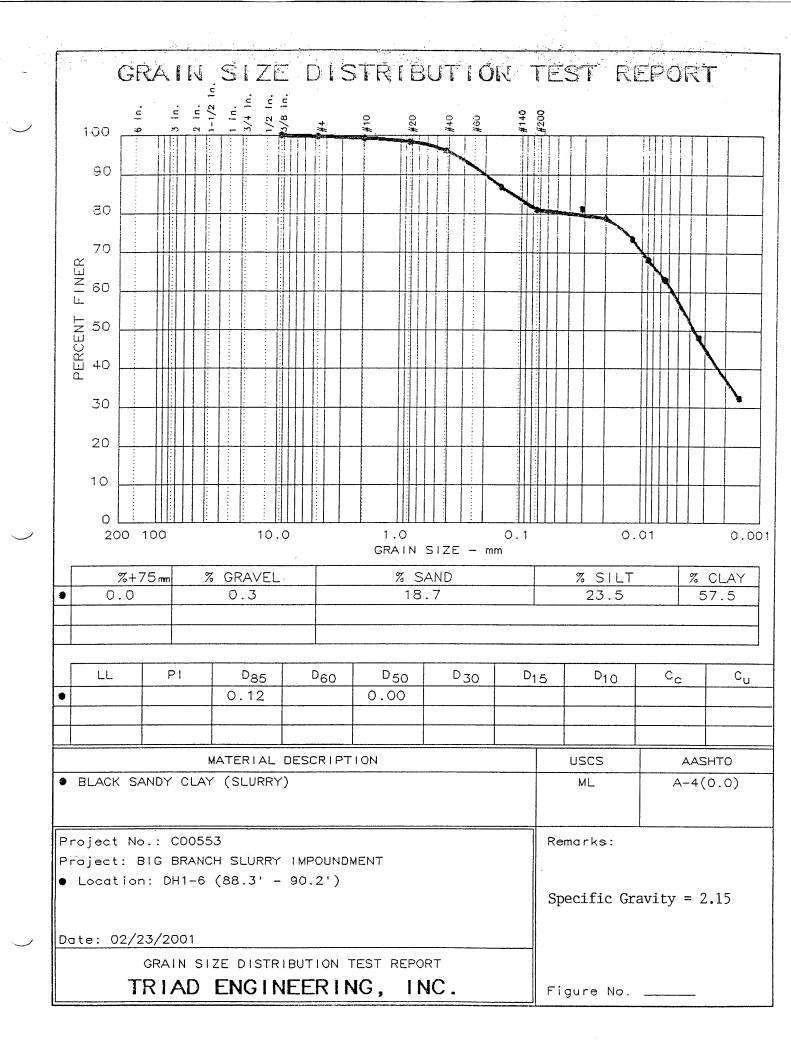
MODULUS OF RUPTURE



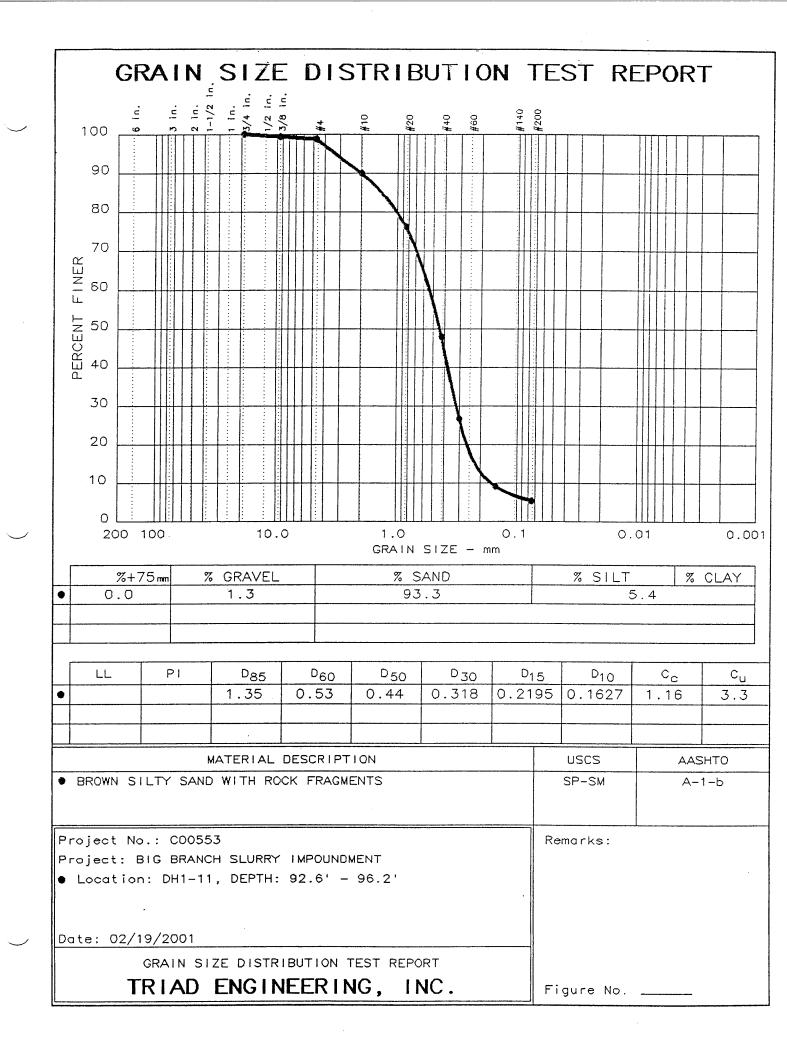




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	MATERIAL DESCRIPTION														<u>i</u> L	JSC	S		T		f	AA!	2H.	ГО											
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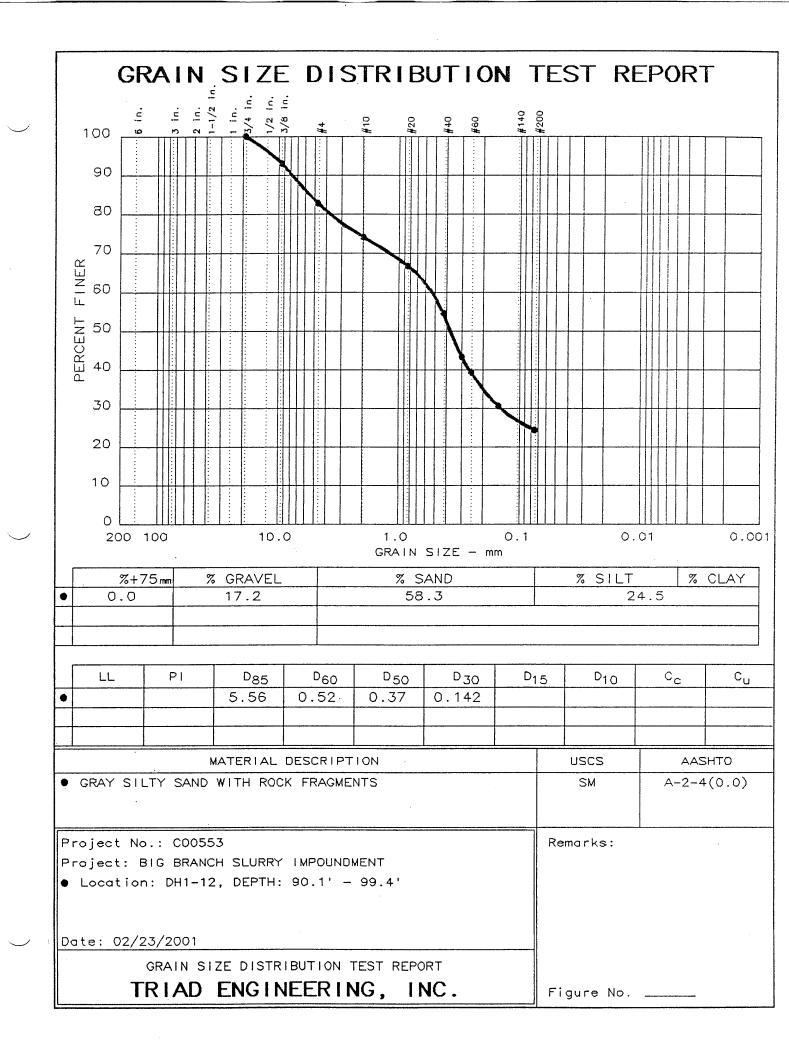


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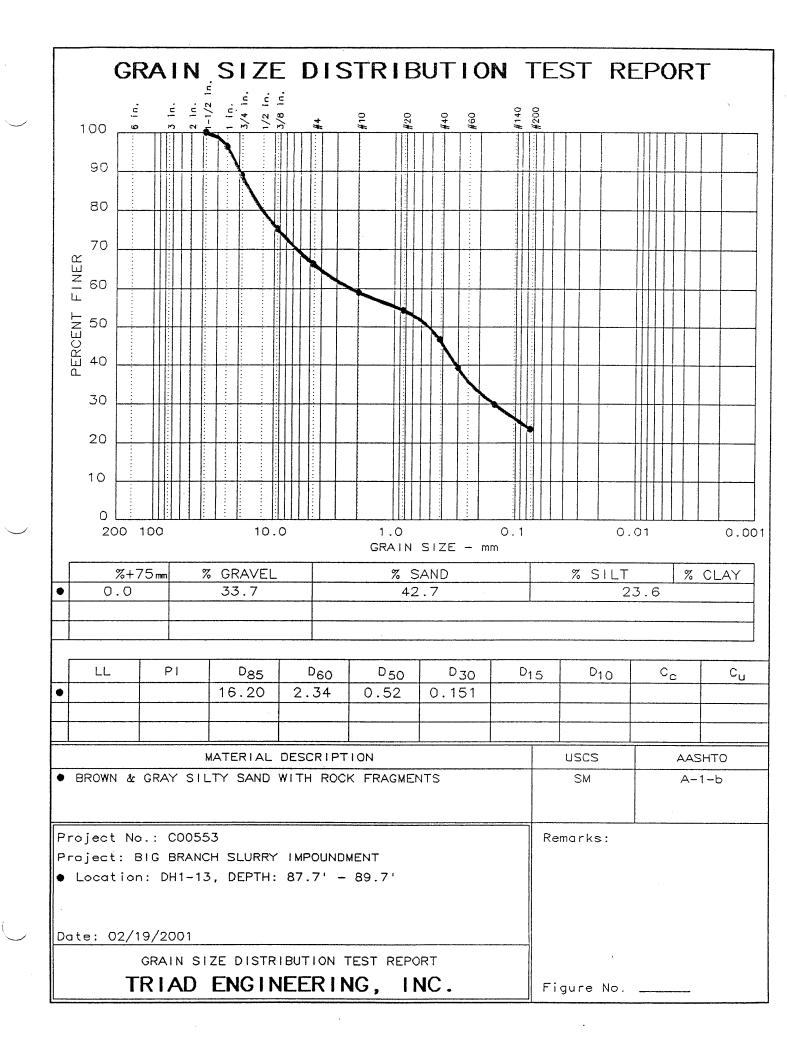


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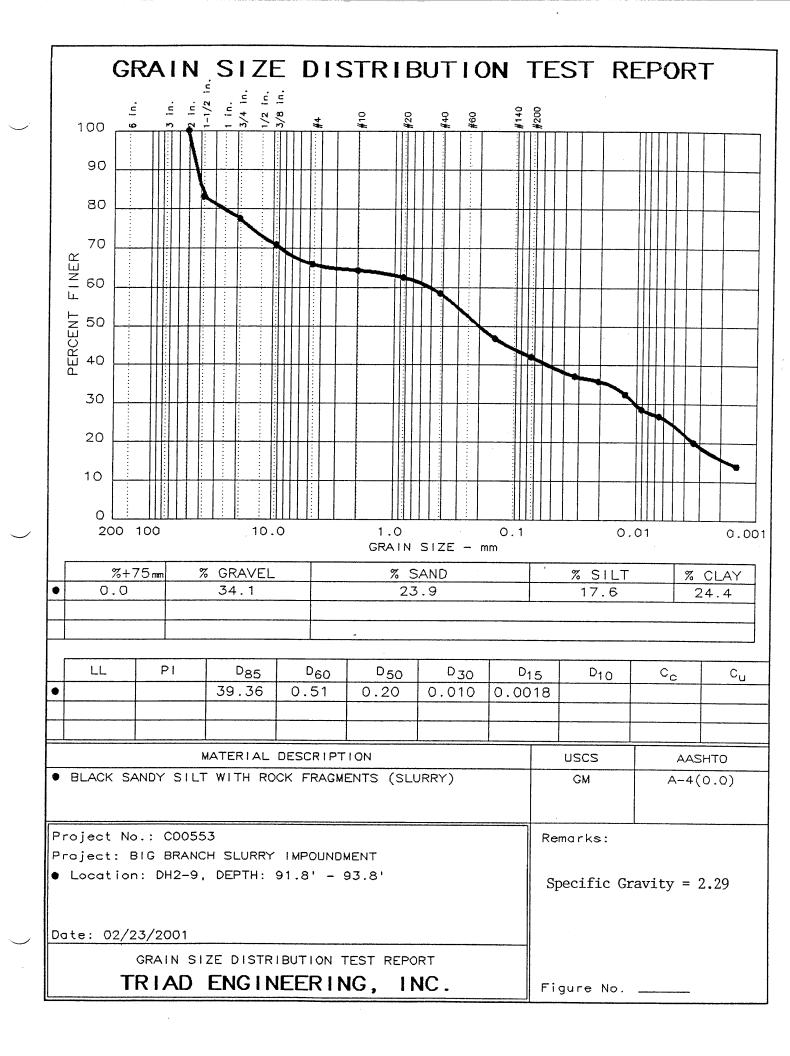
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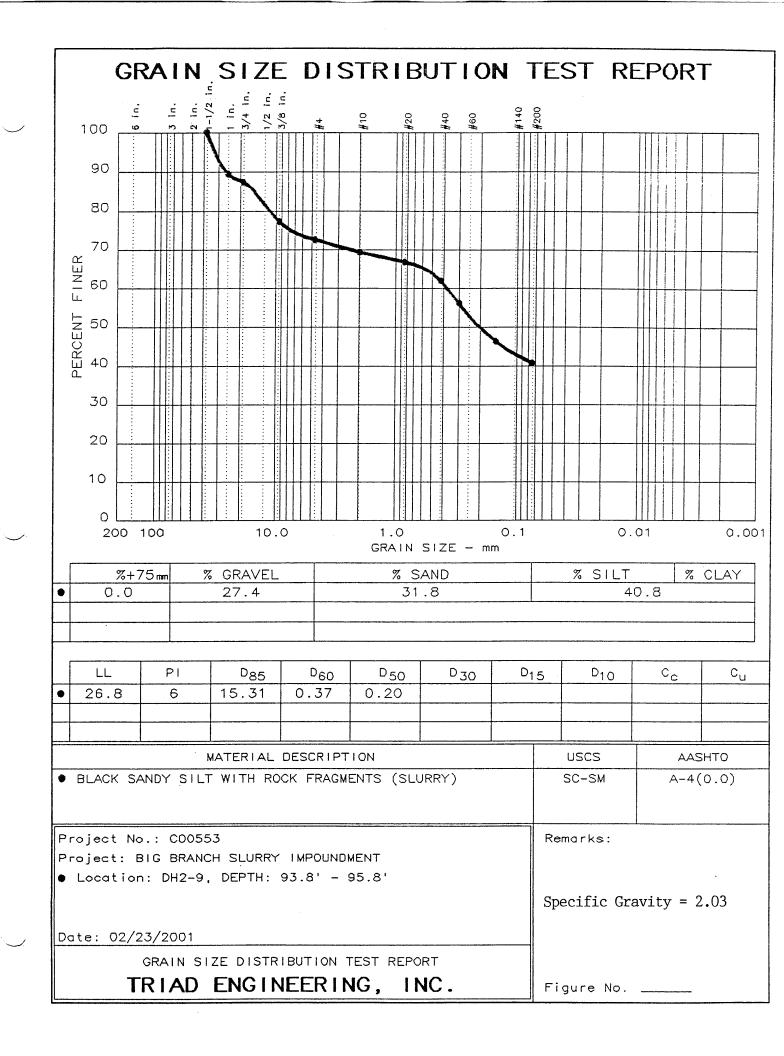


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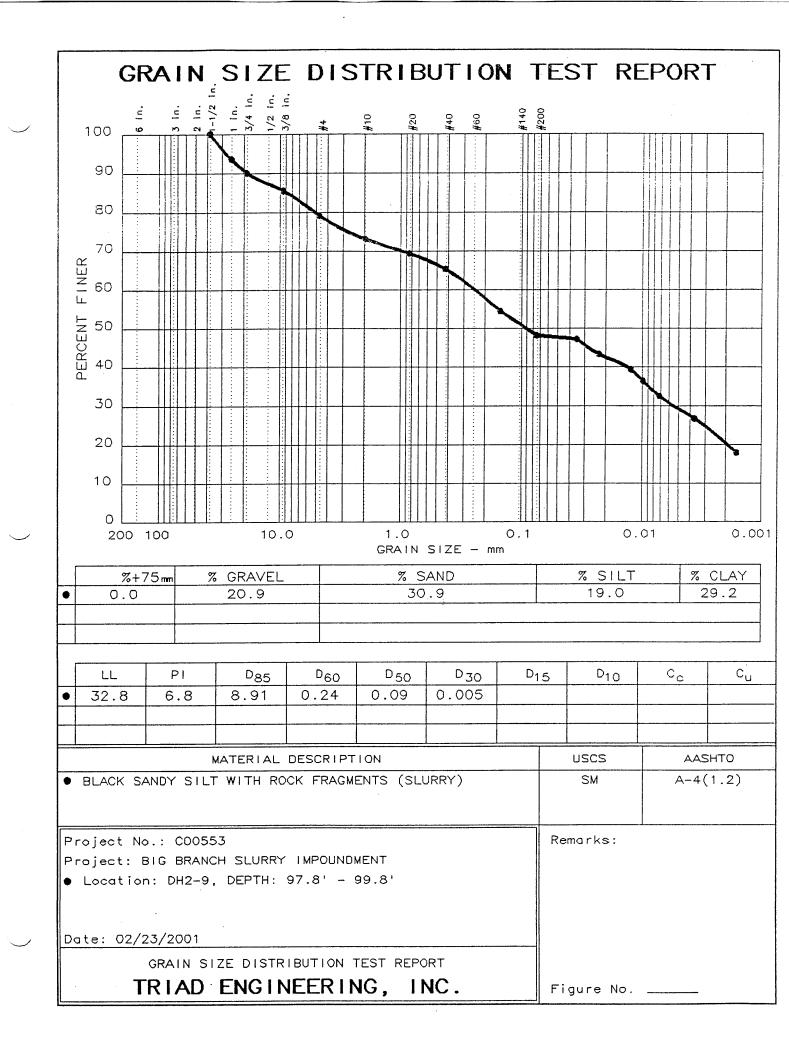
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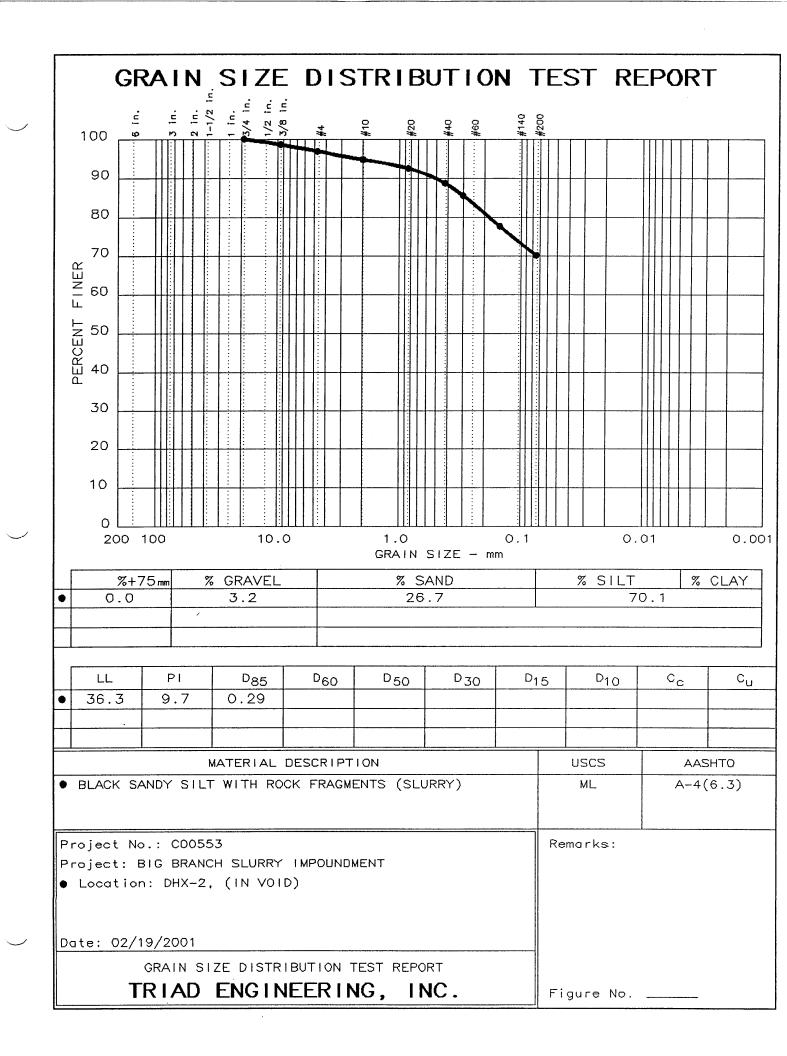


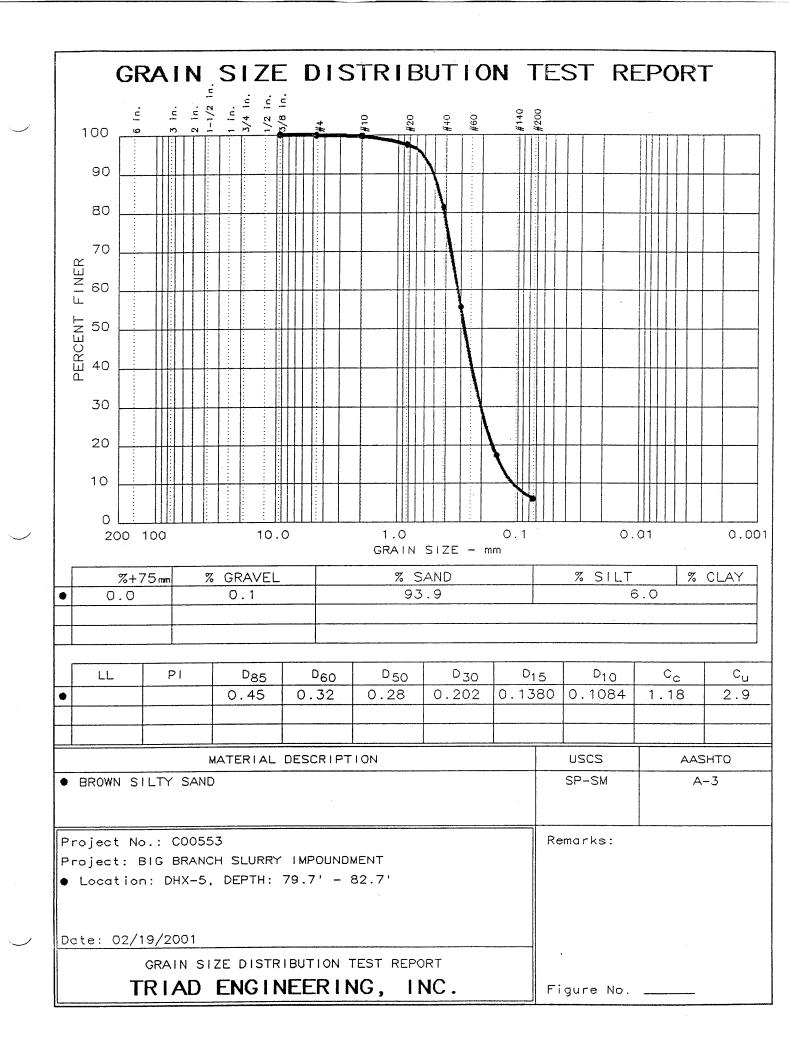
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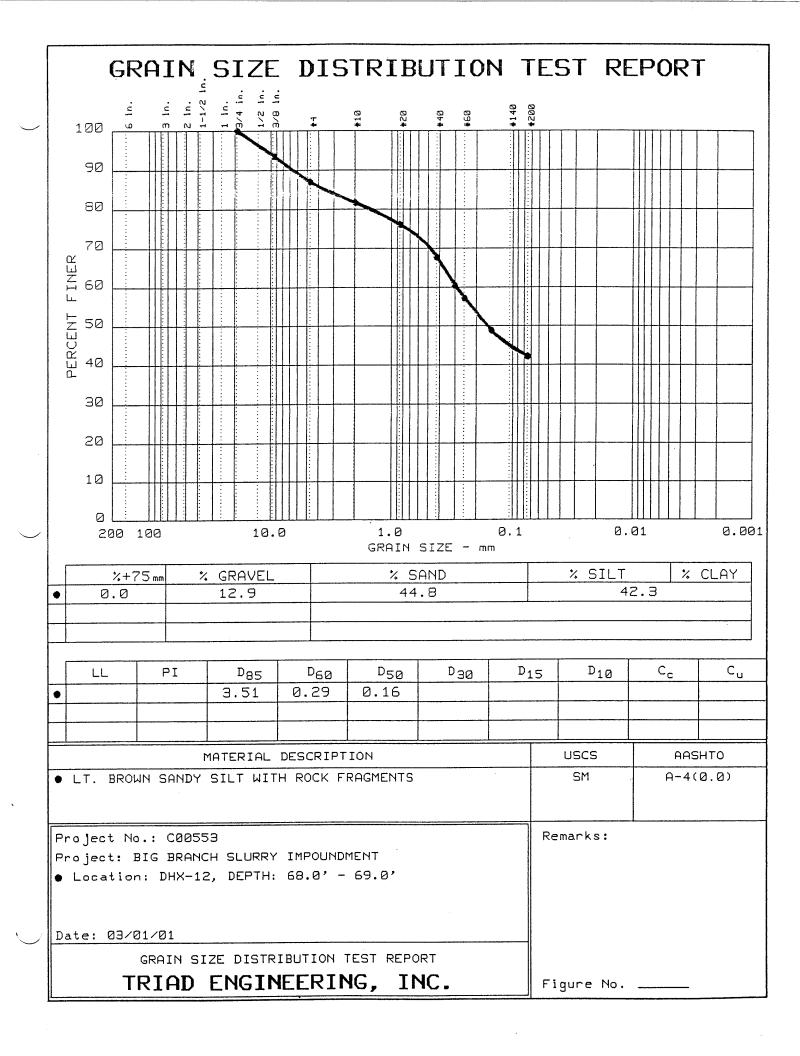


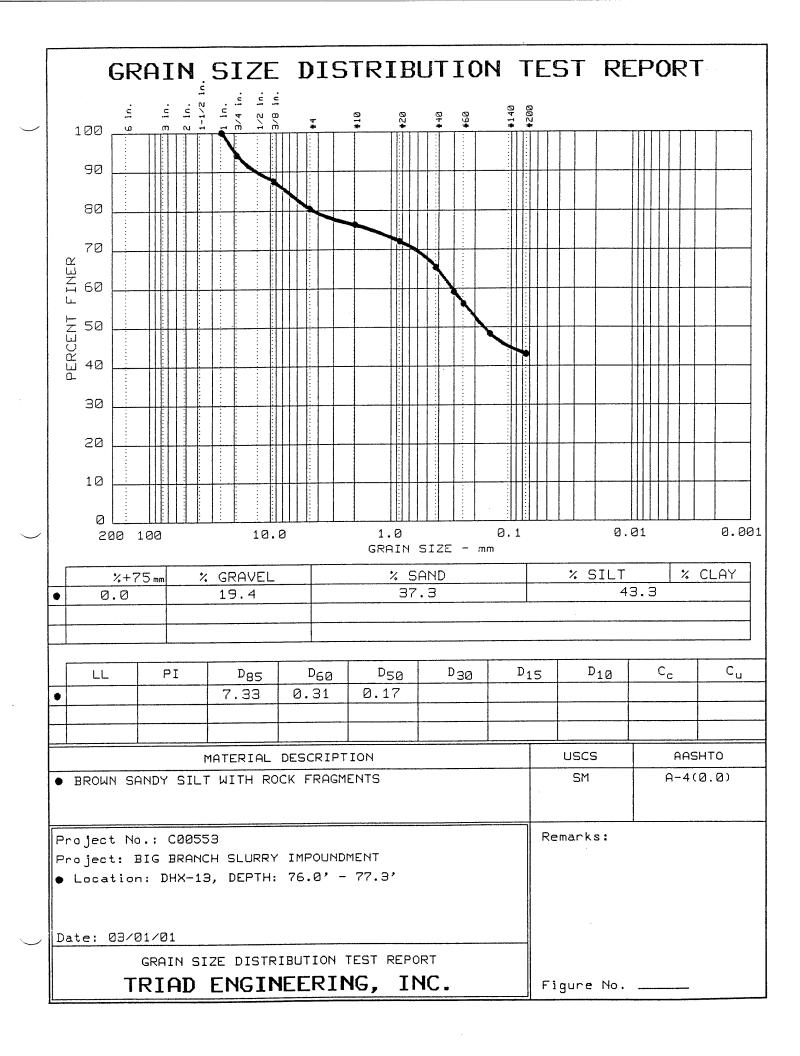
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Project No.	.: C0055	-3					Remarks:	:	
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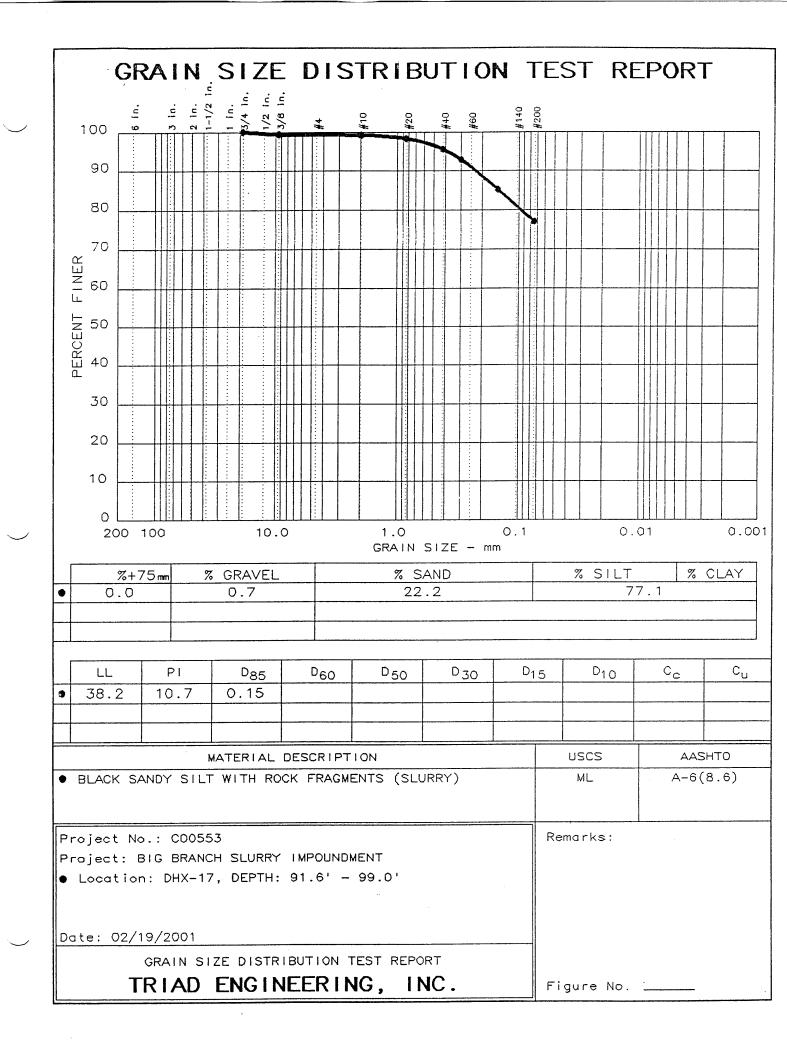


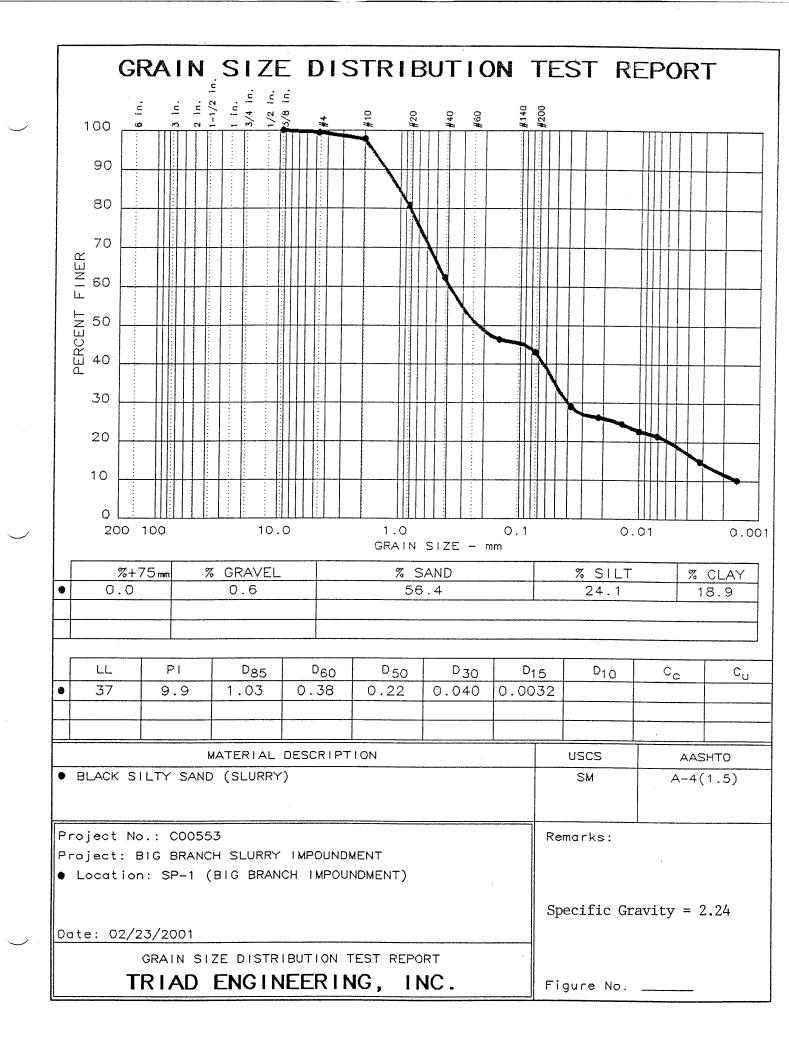


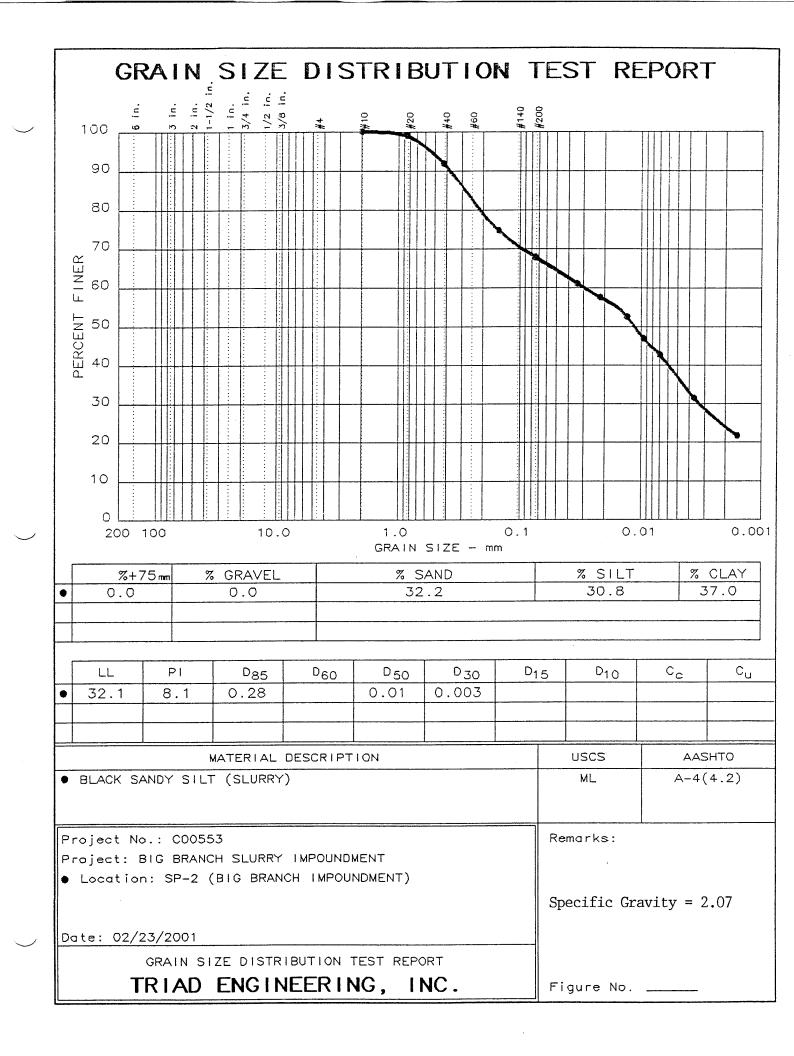


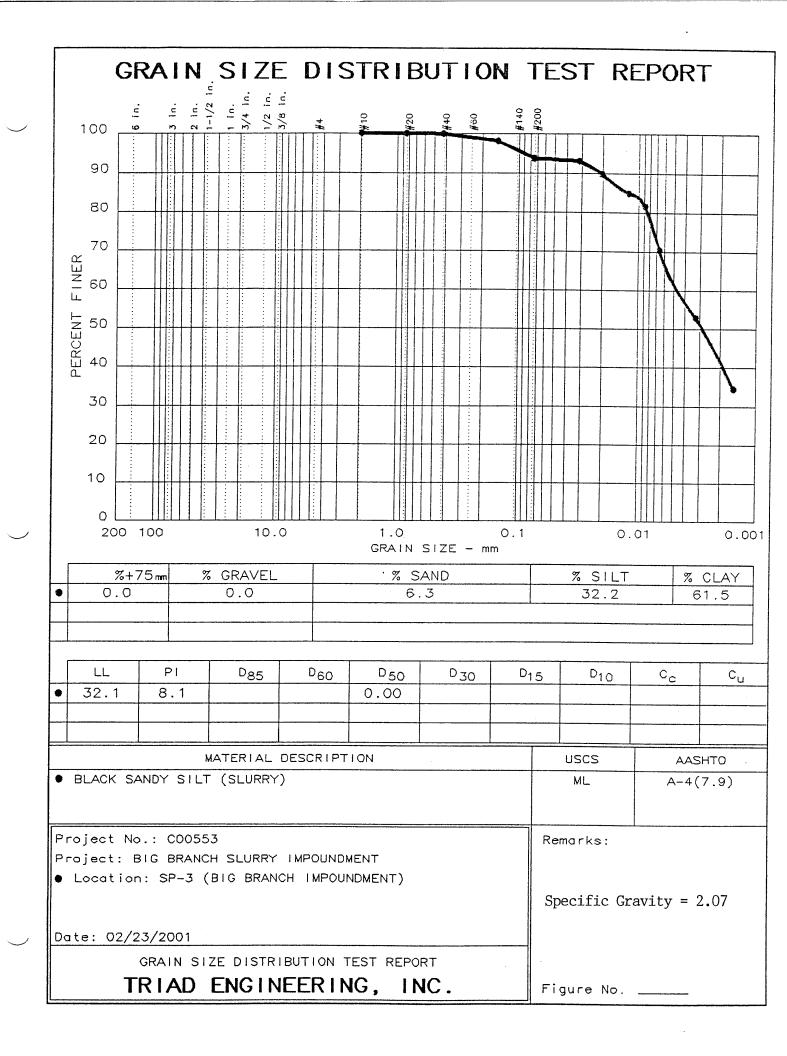


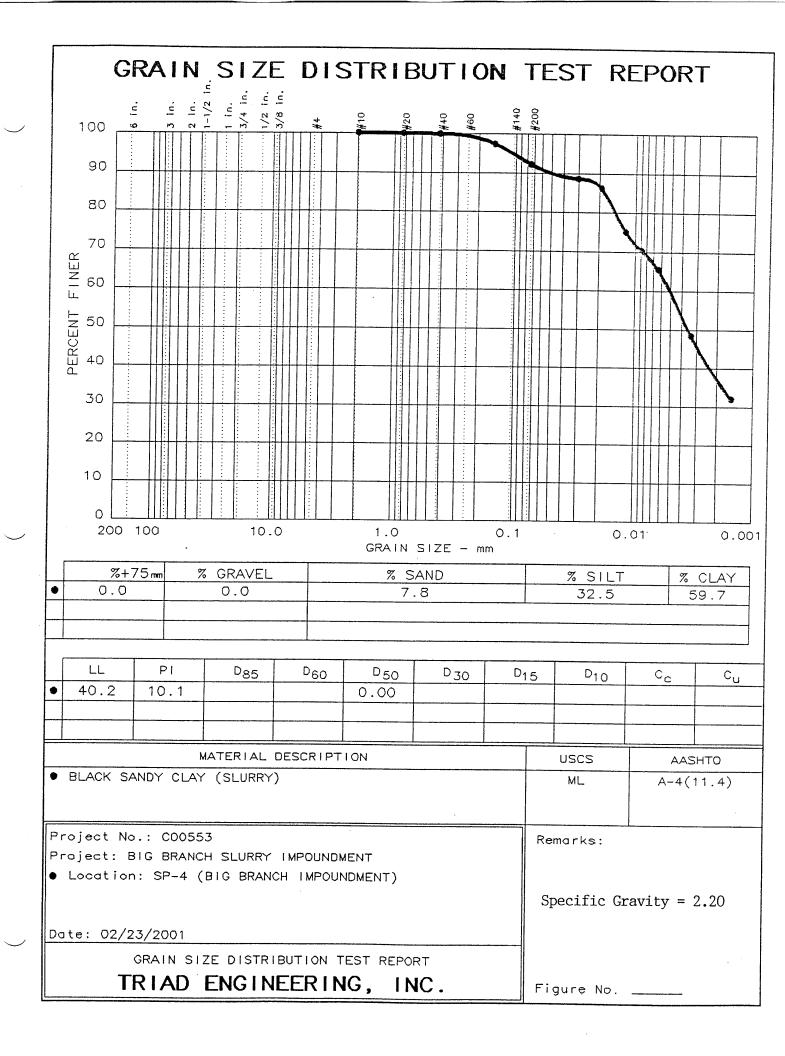
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	• LT. BROWN SILTY SAND WITH ROCK FRAGMENTS							SM	A-2-	4(0.0)
	<u></u>									
	Project:	No.: C005 BIG BRAN	CH SLURRY		Remarks:					
	● Locati	on: DHX-1	3, DEPTH:	84.0′-	86.0'					
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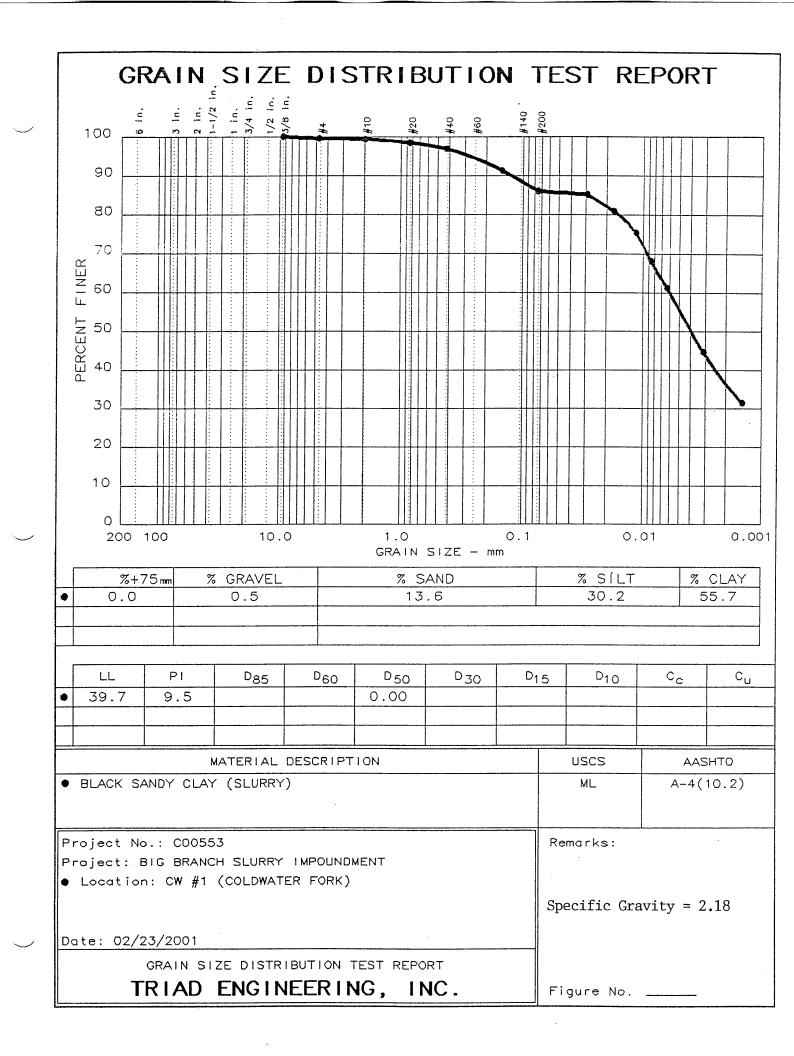


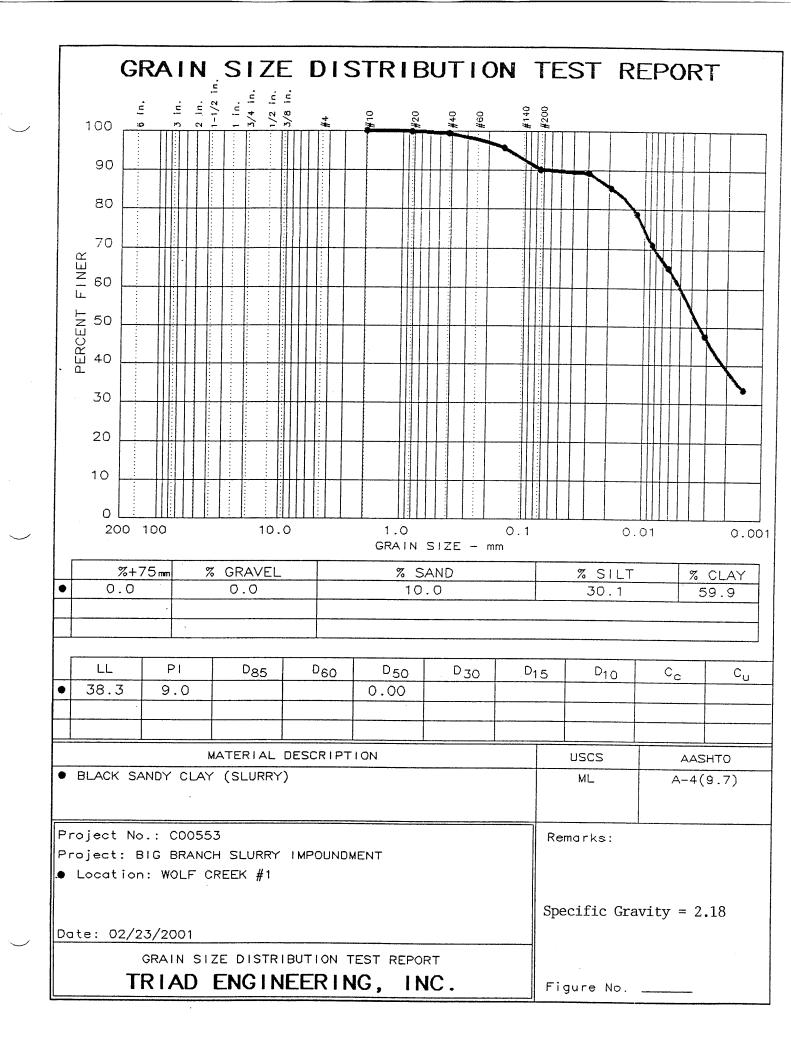


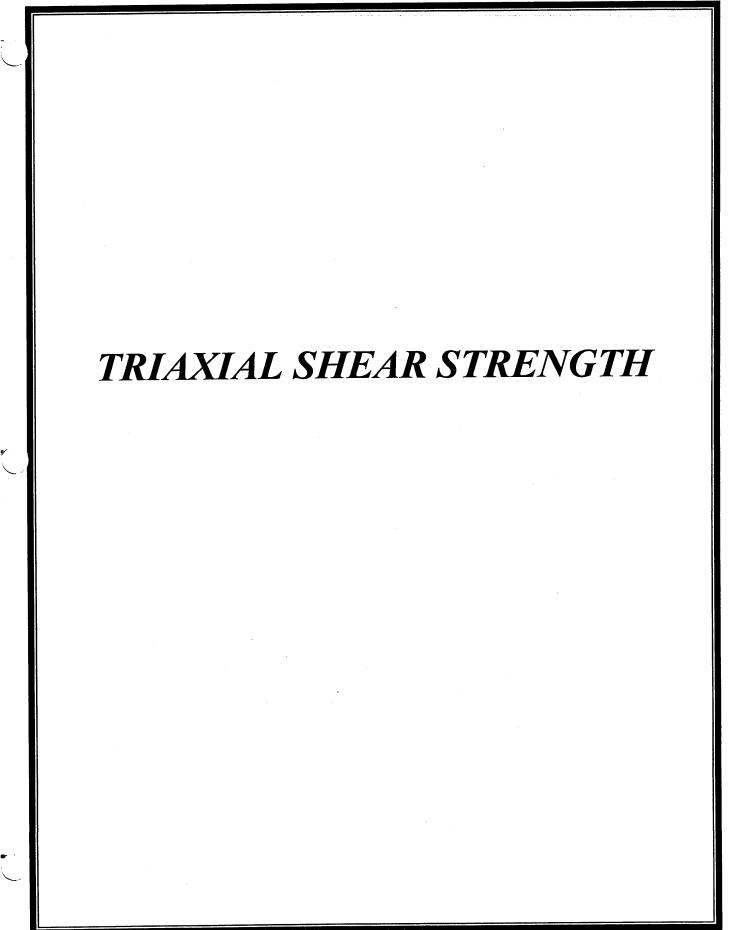


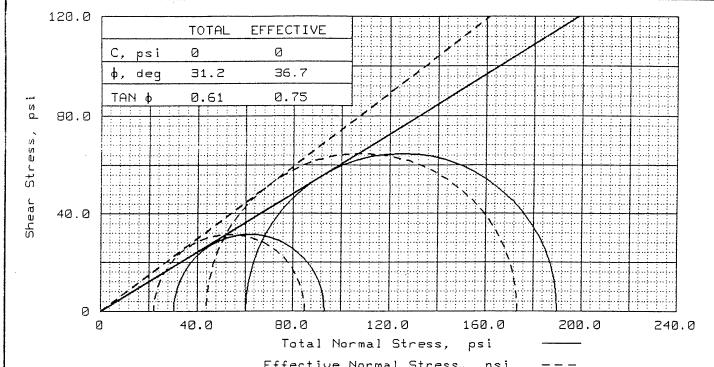




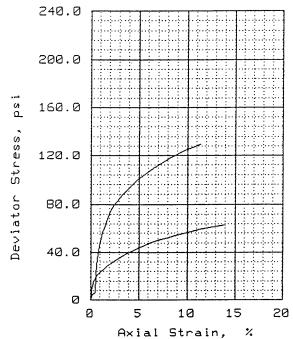








Effective Normal Stress, psi



TYPE OF TEST:

CU with pore pressures SAMPLE TYPE: UNDISTURBED DESCRIPTION: LT. BROWN SANDY SILT WITH ROCK FRAGMENTS LL= PL= PI= SPECIFIC GRAVITY= 2.65 REMARKS:

### SAMPLE NO. 1 2 WATER CONTENT, % 14.1 11.3 DRY DENSITY, pcf 122.2 122.4 SATURATION, % 105.8 85.6 VOID RATIO 0.354 0.351 DIAMETER, in 2.80 2.82 HEIGHT, in 5.85 6.21 WATER CONTENT, % 11.9 12.9 DRY DENSITY, pcf 125.7 123.3 SATURATION, % 99.4 99.8 VOID RATIO 0.316 0.341 DIAMETER, in 2.77 2.81 HEIGHT, in 5.80 6.20 Strain rate, %/min 0.015 0.015 BACK PRESSURE, psi 63.0 129.7 PORE PRESSURE, psi 63.0 129.7 PORE PRESSURE, psi 70					
DRY DENSITY, pcf SATURATION, % 105.8 85.6 VOID RATIO 0.354 0.351 DIAMETER, in 2.80 2.82 HEIGHT, in 5.85 6.21 WATER CONTENT, % 11.9 12.9 DRY DENSITY, pcf 125.7 123.3 SATURATION, % 99.4 99.8 VOID RATIO 0.316 0.341 DIAMETER, in 2.77 2.81 HEIGHT, in 5.80 6.20 Strain rate, %/min 0.015 0.015 BACK PRESSURE, psi 63.0 129.7 PORE PRESSURE, psi 63.0 129.7 PORE PRESSURE, psi PORE PRESSURE, psi PORE PRESSURE, psi PORE PRESSURE, psi FAILURE, psi 84.8 173.1	Sf	AMPLE NO.	1	2	
DRY DENSITY, pcf 125.7 123.3 99.4 99.8 VOID RATIO 0.316 0.341 DIAMETER, in 2.77 2.81 HEIGHT, in 5.80 6.20 Strain rate, %/min 0.015 0.015 BACK PRESSURE, psi 50.0 50.0 CELL PRESSURE, psi 63.0 129.7 PORE PRESSURE, psi 58.2 66.6 ULTIMATE STRESS, psi PORE PRESSURE, psi 75 FAILURE, psi 84.8 173.1	INITIAL	DRY DENSITY, pcf SATURATION, % VOID RATIO DIAMETER, in	122.2 105.8 0.354 2.80	122.4 85.6 0.351 2.82	·
BACK PRESSURE, psi 50.0 50.0 CELL PRESSURE, psi 80.0 110.0 FAILURE STRESS, psi 63.0 129.7 PORE PRESSURE, psi 58.2 66.6 ULTIMATE STRESS, psi PORE PRESSURE, psi PORE PRESSURE, psi To FAILURE, psi 84.8 173.1	13	DRY DENSITY, pcf SATURATION, % VOID RATIO DIAMETER, in	125.7 99.4 0.316 2.77	123.3 99.8 0.341 2.81	
Ō₃ FAILURE, psi 21.8 43.4	BF CE FF	ACK PRESSURE, psi CLL PRESSURE, psi AILURE STRESS, psi PORE PRESSURE, psi TIMATE STRESS, psi PORE PRESSURE, psi	50.0 80.0 63.0 58.2	50.0 110.0 129.7 66.6	
	4	•			

CLIENT: US DEPARTMENT OF LABOR

PROJECT: BIG BRANCH SLURRY IMPOUNDMENT

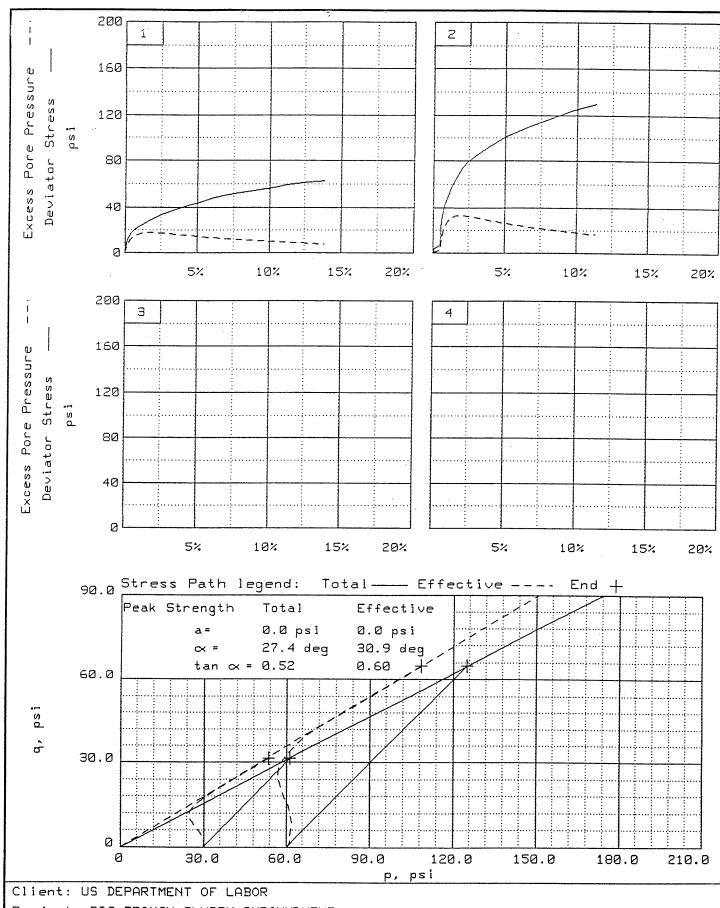
SAMPLE LOCATION: DH1-6, DEPTH: 40.0'-42.0'

DATE: 02/27/01 PROJ. NO.: CØØ553

TRIAXIAL SHEAR TEST REPORT

TRIAD ENGINEERING, INC.

FIG. NO.



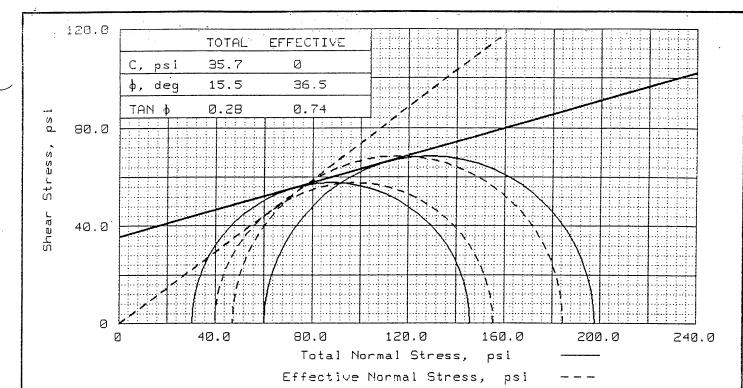
Project: BIG BRANCH SLURRY IMPOUNDMENT Location: DH1-6, DEPTH: 40.0'-42.0'

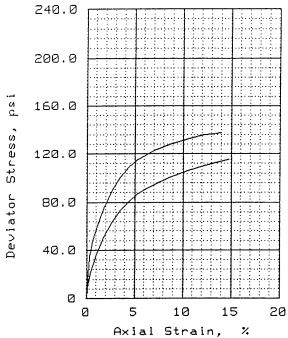
File: C00553

Project No.: C00553

Page 2/2 Fig.

Fig. No. ___





TYPE OF TEST:

CU with pore pressures SAMPLE TYPE: UNDISTURBED DESCRIPTION: LT. BROWN SILTY SAND WITH ROCK FRAGMENTS LL= PL= PI=

SPECIFIC GRAVITY= 2.65

REMARKS:

SF	MPLE NO.	1	2	
INITIAL		125.3	125.0 103.3 0.323 2.85	
AT TEST	DRY DENSITY, pcf SATURATION, % VOID RATIO DIAMETER, in	11.4 126.7 99.1 0.306 2.84 5.77	127.8 99.7 0.295 2.83	
1	rain rate, %/min			
· ·		50.0		
Į.	LL PRESSURE, psi			
FH	ILURE STRESS, psi PORE PRESSURE, psi			
UL	TIMATE STRESS, psi PORE PRESSURE, psi	70.5	03.1	
dō₁	FAILURE, psi	155.1	184.4	
⊽₃	FAILURE, psi	39.5	46.9	

CLIENT: US DEPARTMENT OF LABOR

PROJECT: BIG BRANCH SLURRY IMPOUNDMENT

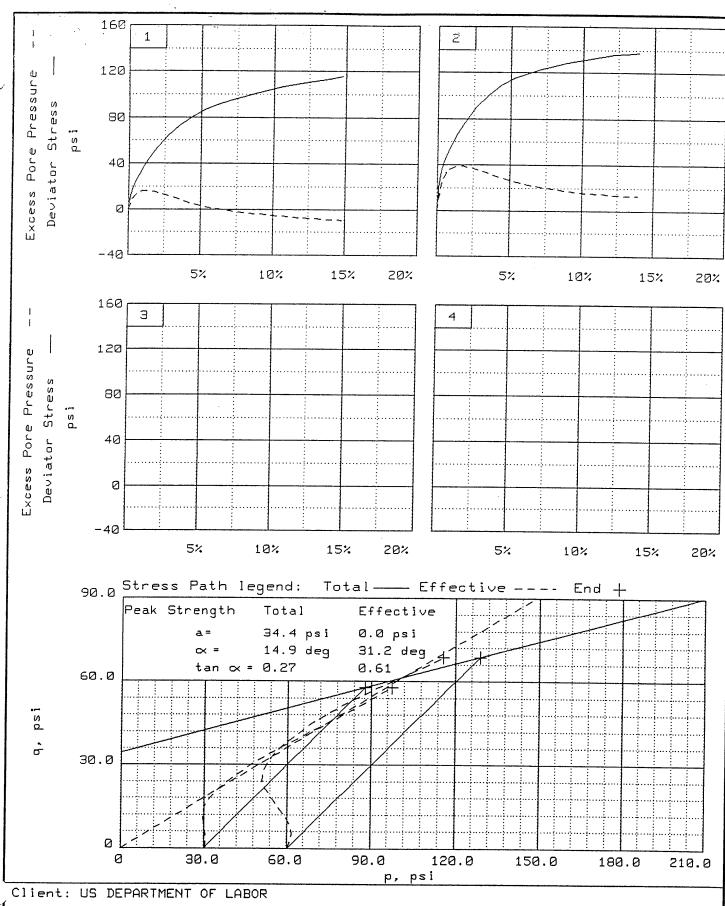
SAMPLE LOCATION: DHX-13 DEPTH: 84.0' - 86.0'

PROJ. NO.: C00553 DATE: 03/05/01

TRIAXIAL SHEAR TEST REPORT

TRIAD ENGINEERING, INC.

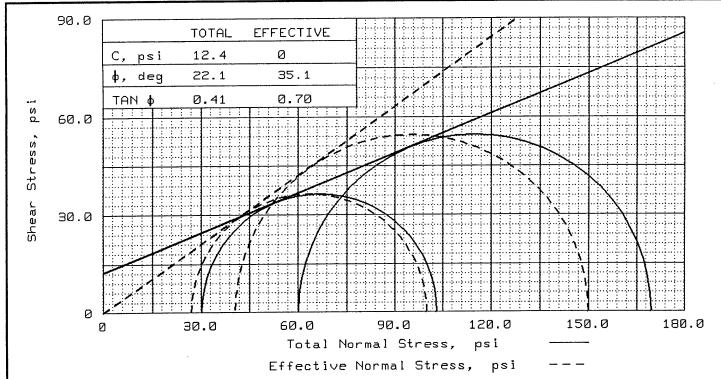
FIG. NO.

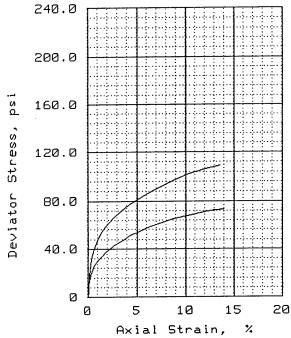


Project: BIG BRANCH SLURRY IMPOUNDMENT Location: DHX-13 DEPTH: 84.0' - 86.0' File: C00553-6

Project No.: C00553

Page 2/2 Fig. No.





TYPE OF TEST:

CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION: BROWN SANDY SILT
WITH ROCK FRAGMENTS
LL= PL= PI=
SPECIFIC GRAVITY= 2.65

FIG. NO.

REMARKS:

•	1	2	
HSITY, pcf TION, % ATIO CR, in	121.8 106.5 0.358 2.85	120.9 106.5 0.368 2.85	
ISITY, pcf TION, % RTIO ER, in	124.1 99.7 0.333 2.83	125.6 99.6 0.317 2.81	
SURE, psi TRESS, psi	80.0 73.0	110.0 109.3	
STRESS, psi RESSURE, psi I, psi	99.8	149.7	
	ASITY, pcf TION, % ATIO TR, in CONTENT, % ASITY, pcf TION, % ATIO TR, in te, %/min SURE, psi TRESS, psi	CONTENT, % 14.4 HSITY, pcf 121.8 HOON, % 106.5 HTIO 0.358 ER, in 2.85 LIN 5.79 CONTENT, % 12.5 HSITY, pcf 124.1 HOON, % 99.7 HTIO 0.333 ER, in 2.83 LIN 5.75 HE, %/min 0.015 SURE, psi 50.0 RESSURE, psi 73.0 RESSURE, psi 73.0 RESSURE, psi 53.2 RESSURE, psi 99.8	CONTENT, % 14.4 14.8 15ITY, pcf 121.8 120.9 100, % 106.5 106.5 0.358 0.368 2.85 2.85 5.79 6.01 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85

CLIENT: US DEPARTMENT OF LABOR

PROJECT: BIG BRANCH SLURRY IMPOUNDMENT

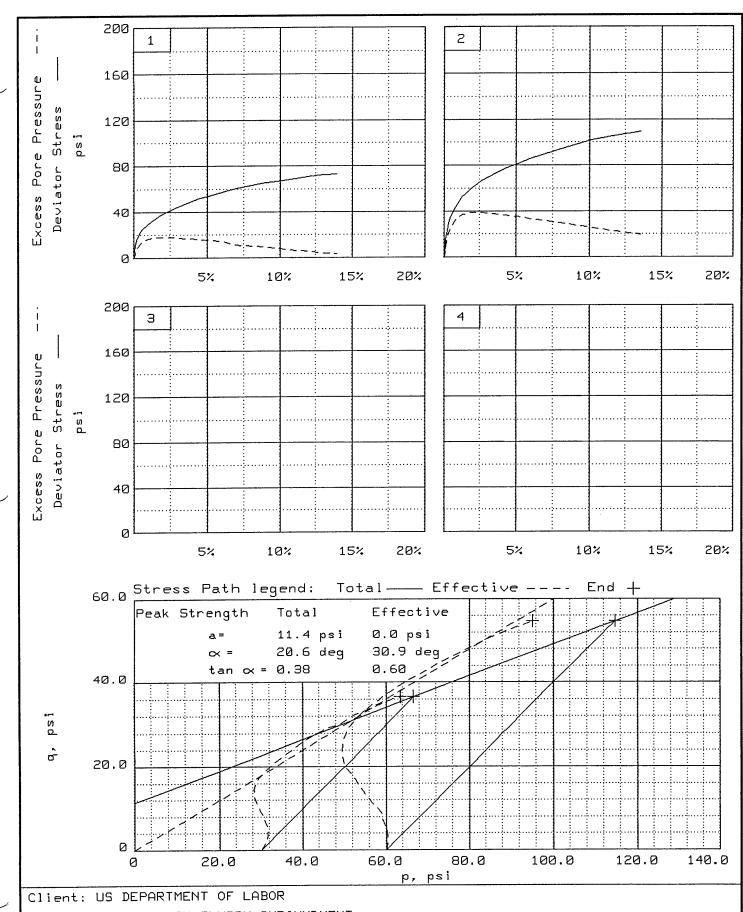
SAMPLE LOCATION: DHX-12 & 13

DEPTH: 68.0' - 69.0' & 76.0' - 77.3'

PROJ. NO.: C00553 DATE: 02/28/01

TRIAXIAL SHEAR TEST REPORT

TRIAD ENGINEERING, INC.



Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DHX-12 & 13 DEPTH: 68.0' - 69.0' & 76.0' - 77.3'

File: C00553-1 Pr

Project No.: C00553

Page 2/2

Fig. No.

PERMEABILITY

FLEXIBLE WALL PERMEABILITY TEST

(ASTM D5084, METHOD - C)

	STANDARD	PROCTOR () MODIF	PECIMEN COMPACTI	ON EFFORT UNDISTURBED	K)	OTHER ()
	MOISTURE	CONTENT	•	SPECIM	EN COMPACT	ION	PERMEABILIT
CONTAINER N	vo. MA	.N		MAX.DRY DENSITY		PCF	K= -(C/t) ln(1 -D) WHERE:
WET WT.		5.84	GMS	OPTIMUM MOISTURE		8	MANOMETER CONSTANT M1= 0.03018
DRY WT		8.79	GMS	WET WT.	1318.8	GMS	M2= 1.04095
TARE WT.		. 2	GMS	неіснт 5.850 і			C= TEST CONSTANT (M1) (L/A) /12.56
WT. MOISTUR	u <u>z 27</u>	. 05	GMS	VOLUME 0.			T= TRIAL CONSTANT
WT. DRY SOI	r <u> </u>	1.59	GMS	WET UNIT WT. 13		PCF	M2/Z
MOISTURE CO	NTENT 14	.1		DRY UNIT WT. 12	2.5	PCF	Z= DIFF. IN MERCUR MENISCI AT t=0,
				PERCENT COMPACTION	1		t= TIME INTERVAL,
			MANOMETER	DATA			D= MERCURY DISPLAC OVER TIME t, CM
(K)				(Z)	(t)	(D)	L= SPECIMEN LENGTH
CALCULATED COEFF. OF PERMEABILITY	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME Interval (SEC)	DIFF. IN VOLUME (CM)	A= SPECIMEN AREA,
	2/12/01	10:38	24.5	0.8			COEFFICIENT OF PERMEABILITY
9 X 10 ⁻⁶		10:48	3.4	23.7	600	21.1	$K = \frac{4.2 \times 10^{-6} \text{ cm/s}}{10}$
							avg. temp. 21.7
0 x 10 ⁻⁶	2/12/01	1:07	28	0.5			VISCOSITY CORRECTION FOR TEMPERATURE:
		1:17	3.4	27.5	600	24.6	0.9600
	2/13/01	1:02	28	0.5	****	w w w>	•
б х 10 ⁻⁶		1:10	3.9	27.5	480	24.1	

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GREENSBURG, PENNSYLVANIA

FLEXIBLE WALL PERMEABILITY TEST

(ASTM D5084, METHOD - C)

PREPARED BY:	MAD	TESTED B	y: MAD	PERMEAMETER NO	.:3		
	STANDARD	PROCTOR (PECIMEN COMPACT:	ION EFFORT UNDISTURBE	> (X)	OTHER ()
	MOISTUR	E CONTENT		SPECIM	EN COMPACT	ION	PERMEABILIT
				····			K= -(C/t) ln(1 -D(- WHERE:
CONTAINER 1	00			MAX.DRY DENSITY_		PCF	MANOMETER CONSTANT
WET WT.	200	4.12		OPTIMUM MOISTURE		 ө	M1= 0.03018
DRY WT	00	2.24	GMS	WET WT.	***************************************	GMS	M2= 1.04095 C= TEST CONSTANT
TARE WT.		• <i>.</i> 7	GMS	неіснт <u> 6.005</u> і	_		(M1) (L/A)/12.56
WT. MOISTUF WT. DRY SOI			GMS		0.02208	CU.FT.	T= TRIAL CONSTANT M2/Z
MOISTURE CO	4/		GMS 8	WET UNIT WT. 1		PCF	Z= DIFF. IN MERCURY
		·	*	PERCENT COMPACTIO		PCF	MENISCI AT t=0,
			MANOMETER 1				t= TIME INTERVAL, S D= MERCURY DISPLACE OVER TIME t, CM
(K)				(Z)	(t)	(D)	L= SPECIMEN LENGTH,
CALCULATED COEFF. OF PERMEABILITY	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME INTERVAL (SEC)	DIFF. IN VOLUME (CM)	A= SPECIMEN AREA, C
8	2/15/01	1:08	29,2	0.5			COEFFICIENT OF PERMEABILITY
2 X 10 ⁻⁸							K= 9.0 x 10 ⁻⁸ cm/s
	 	4:38	9.2	28.7	12,600	20	· · · · · · · · · · · · · · · ·
	<u> </u>						avg. temp. 21.8
4 X 10 ⁻⁸	2/16/01	3:51	28.4	0.6		~~~	VISCOSITY CORRECTIO FOR TEMPERATURE:
		4 : 39	21.4	27.8	2,880	7	0,9577
	2/19/01	11:44	28.9	0.6			
3 X 10 ⁻⁸	2, 17, 01						
· · · · · · · · · · · · · · · · · · ·		4:54	6.5	28.3	18,600	22.4	

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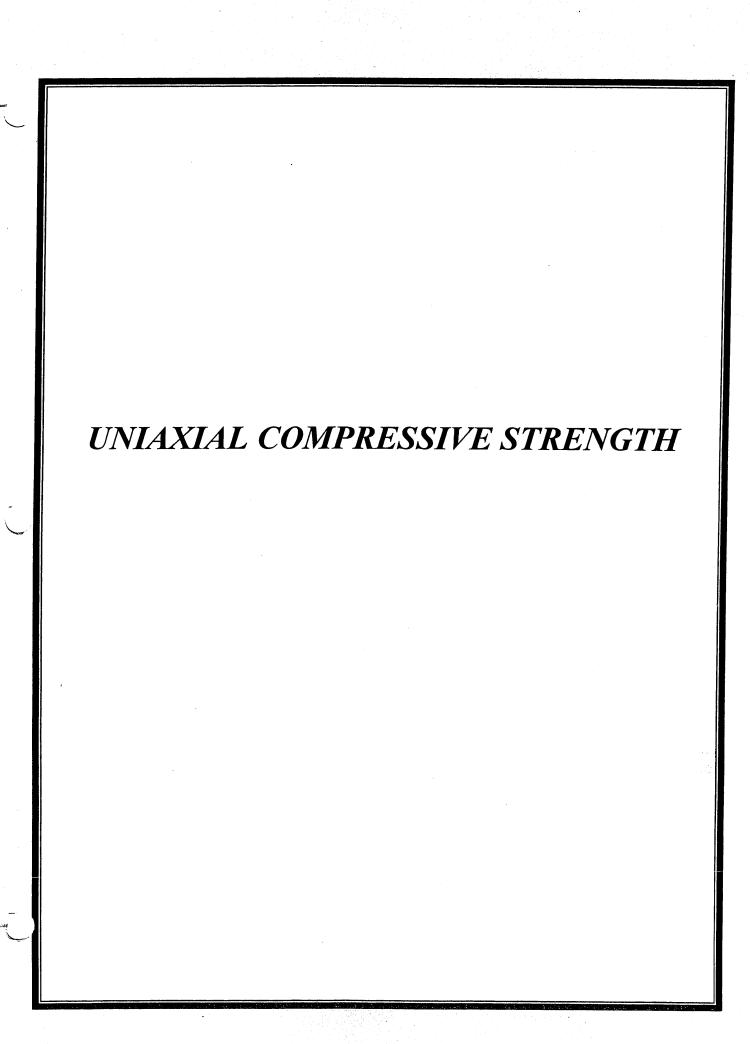
FLUMIBLE WALL PERMITETHITY TEST

(ASTM D5084, METHOD - C)

	ia Bronch	Clinari Ta	mou made aunt		~	20552	
PROJECT: E							
SAMPLE INFO:				SAMPLE DESCRIPTION	on: <u>Light bro</u>	wn silty sar	nd with rock fragments
PREPARED BY:	('AU	TESTED 3	BY: MAD	PERMEAMETER NO	D.: 4		·
			луст з	77677677 60477 6	TOX 27702		
	STANDAR	D PROCTOR (PECIMEN COMPACT IED PROCTOR ()		X)	OTHER ()
	MCISTUR	LE CONTEN	r	SPECI	MEN COMPACT	ION	PERMEABILITY
			**************************************				X= -(C/t) ln(1 -0(T)) WHERE:
CONTAINER :	10	. T		MAK.DRY DENSITY_		PCF	MANCMETER CONSTANTS
жет жт		226.19	GMS	OPTIMUM MOISTURE		3	M1= 0.03013
DRY WT.		215.5		Wet WT.	1372.0	GMS	M2= 1.04095
TARE WT.		130.6		неізнт 5.820	N DIAMETER	2.850 IN	C= TEST CONSTANT (M1) (L/A) /12.56
WT. MOISTUR	vs	10.69		ACTOWE (೮೮. ೯೩.	T= TRIAL CONSTANT
WT. DRY SOI		84.9	GMS GMS	WET UNIT WT.	L40.7	?CF	M2/Z
MOISTURE CO	TKETK	12.6	3	DRY UNIT WT.	124.9	?C7	I= DIFF. IN MERCURY MENISCI AT t=0, CM
	· · · · · · · · · · · · · · · · · · ·	····		PERCENT COMPACTIO	N	3	t= TIME INTERVAL, SEC
			MANCMETER	DATA			D= MERCURY DISPLACED OVER TIME t, CM
(X)		1		(Z)	(t)	(D)	L= SPECIMEN LENGTH, CM
CALCULATED COEFF. OF PERMEABILITY	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME INTERVAL (SEC)	DIFF. IN VOLUME (CM)	A= SPECIMEN AREA, CM ²
	2/27/01	2:58	28.5	0.5			COEFFICIENT OF PERMEABILITY
1.4 X 10 ⁻⁷	2/2//01						$K = \frac{1.4 \times 10^{-7}}{\text{CM/SEC}}$
	ļ	3:34	20.6	28	2,160	7.9	
							avg. temp. 22.7 °c
1.4 X 10 ⁻⁷	2/28/01	8:09	27.7	0.6			VISCOSITY CORRECTION FOR TEMPERATURE:
1.4 X 10		11:18	5.8	27.1	11,340	21.9	0.9377
	0 /00 /01	2 27	00.0	0 =			
1.3 X 10 ⁻⁷	2/28/01	3:37	28.9	0.5			
		4:59	14.6	28.4	4,920	14.3	
REMARKS: CO	ONFINING PR	RESSURE 10	PSI (CELL PRES	SSURE 70 PSI, BACK PF	ESSURE 60 PSI)		K= 1.3 x 10 CM/SEC
						<u> </u> L	

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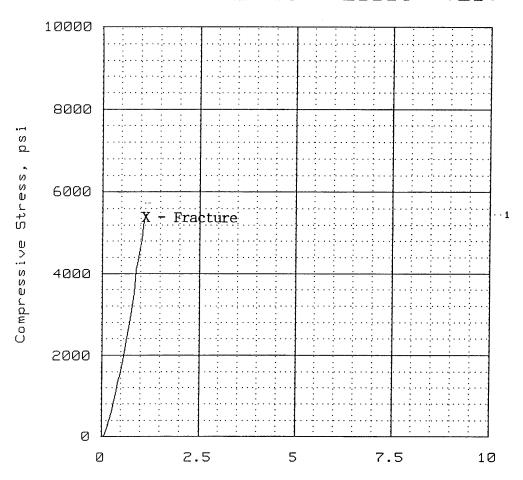




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PROJECT NoC00553		_DATE:_	2/15/01	<u> </u>	
PROJECT NAME: Big Branch S					
CORE No. DH1-3 (83.9'-84.2')	TYPE	OF CURE			
LENGTH (AFTER CAP) #1:3					
#2: _ 3	3.965	in.	AVERAGE:	3.963	in.
	960				
DIAMETER #1:1	.980	in.			
#2: <u>1</u>	.980	<u>in.</u>	AVERAGE:	1.980	in.
	.980				
LENGTH TO DIAMETER RATIO (L/D) 2.0	0			
AREA: 3.08 in.2 COP					
LOAD: 18,800			6,100	-	
CORRECTED PSI: 6,100					
REMARKS:	·				
·					
TESTED BY: J.M. Sayre	CHE	CKED BY	M. Ali D	astgheib	

UNCONFINED COMPRESSION TEST



Axial Strain, %

Sample number:	1				
Unconfined strength, psi	5464				
Undrained shear strength, psi	2732				
Strain rate, %/min					
Water content, %	0.0				
Void ratio	535.7343				
Saturation, %	0.0				
Dry density, pcf	0.3				
Specimen diameter, in	1.99				
Specimen height, in	3.92				
Description: LT. GRAY MED. GRAINED SANDSTONE					

PI = PL = Type: ROCK GS = 2.7

Project No.: C00553

Date: 03/01/01

Remarks:

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-3

DEPTH: 85.0' - 85.4'

UNCONFINED COMPRESSION TEST

TRIAD ENGINEERING, INC.

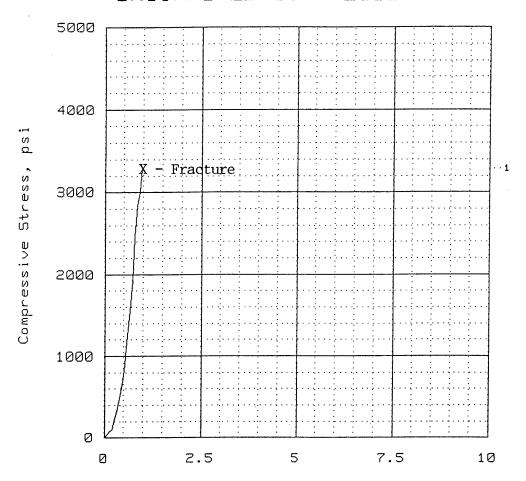
Fig No.



ST. ALBANS. LOGAN & MORGANTOWN. WEST VIRGINIA WINCHESTER & HARRISONBURG. VIRGINIA GREENSBURG. PENNSYLVANIA

PROJECT No. C005	53	DATE: _	2/15/01		
PROJECT NAME: Big !	Branch Slurry Impo	undment			
CORE No. DH1-4 (78.9					
LENGTH (AFTER CAP)	#1: 3.715	in.			
	#2:	in.	AVERAGE:	3.717	. in.
	#3: <u>3.720</u>	in.			
DIAMETER	#1: <u>1.975</u>	in.			
	#2: 1.975	in.	AVERAGE:	1.975	in.
	#3: <u>1.975</u>	in.			
LENGTH TO DIAMETER	RATIO (L/D) 1.	.88		······································	
AREA: 3.06 in	.2 CORRECTION	FACTOR:	0.994		
LOAD: 15,250 Ib	S	PSI:	4,980		
CORRECTED PSI: 4,95	50				
REMARKS:					
TESTED BY: J.M. Sayr	ce CH	ECKED BY	: M. Ali D	astgheib	





Axial Strain, %

Sample number:	1	
Unconfined strength, psi	3291	
Undrained shear strength, psi	1645	
Strain rate, %/min		
Water content, %	0.0	
Void ratio		
Saturation, %	0.0	
Dry density, pcf	•	
Specimen diameter, in	1.98	
Specimen height, in	3.88	
Description: LT BROWN MED GRAINED	SANDSTONE	

Description: LT. BROWN MED. GRAINED SANDSTONE

LL = PL = PI = GS = 2.7 Type: ROCK

Project No.: C00553

Date: 03/01/01

Remarks:

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-4

DEPTH: 83.2' -83.8'

UNCONFINED COMPRESSION TEST

TRIAD ENGINEERING, INC.

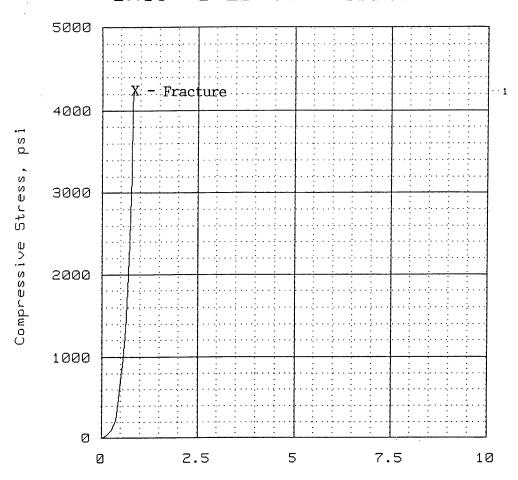
Fig No.



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJEC'	T No	C005.	53			_ DA	TE:_	2/15/01		
PROJECT	T NAME:_	Big	Brancl	Slurry	Impo	undme	ent			
CORE No	o. <u>DH1-5</u>	(83.2	'- 83.	7 ')	TYPE	OF	CURE		***************************************	
LENGTH	(AFTER	CAP)	#1:	3.855			in.	-		
			#2:	3.870			in.	AVERAGE:_	3.862	in.
			#3:	3.860			in.	-		
	DIAME	TER	#1 : .	1.970			in.	-		
			#2:	1.970			in.	AVERAGE:_	1.970	in.
			#3:	1.970			in.	•		
LENGTH	TO DIAM	ETER	RATI	0 (L/D)1	.96				
AREA:	3.05	in	.2	CORREC	TION	FAC	TOR:	1		
LOAD:	18,050	<u>Ib</u>	s	_			PSI:	5,920		
CORRECT	TED PSI:	5,	920	·						
REMARKS	S:			,						
TESTED	BY: J.	M. Sa	yre		СН	ECK	ED BY	/: M.Ali	Dastgheib	

UNCONFINED COMPRESSION TEST



Axial Strain, %

Sample number:	1	
Unconfined strength, psi	4230	
Undrained shear strength, psi	2115	
Strain rate, %/min		
Water content, %	0.0	
Void ratio		
Saturation, %	0.0	
Dry density, pcf		
Specimen diameter, in	1.97	
Specimen height, in	4.07	
Descriptions LT CDOV MED COOTNED	CONDCTONE	The state of the s

Description: LT. GRAY MED. GRAINED SANDSTONE

LL = PL = PI = GS = 2.7 Type: ROCK

Project No.: C00553

Date: 03/01/01

Remarks:

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-5

DEPTH: 84.6' -85.1'

UNCONFINED COMPRESSION TEST

TRIAD ENGINEERING, INC.

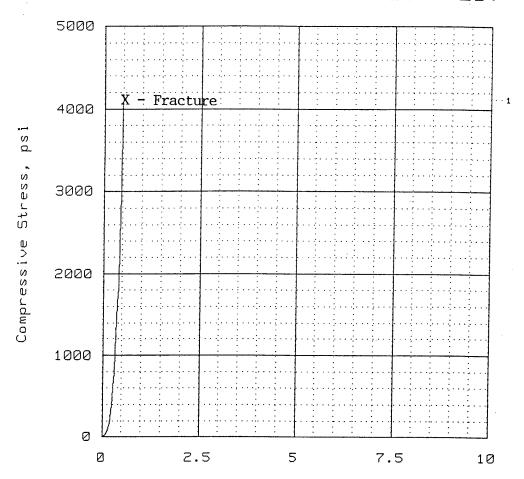
Fig No.



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT NoCOO)553	DATE: _	2/15/01		
PROJECT NAME: Big	Branch Slurry I	mpoundment			
CORE No. DH1-8 (81.					
LENGTH (AFTER CAP		in.			
	#2:3.900	in.	AVERAGE:	3.903	in.
	#3: <u>3.905</u>	in.	-		
DIAMETER	#1: 1.985	in.			
	#2: <u>1.980</u>	in.	AVERAGE:	1.983	<u>in.</u>
	#3: <u>1.985</u>	in.			
LENGTH TO DIAMETER	RATIO (L/D)_	1.97			
AREA: 3.09 i					
LOAD: 17,600 I	bs	PSI:	5,700		
CORRECTED PSI:		•			
REMARKS:					
TESTED BY: M. Ali Da	stgheib	CHECKED BY	. M. A1	i Dastghei	b

UNCONFINED COMPRESSION TEST



Axial Strain, %

Sample number:	1		
Unconfined strength, psi	4125		
Undrained shear strength, psi	2063		
Strain rate, %/min			
Water content, %	0.0		
Void ratio			
Saturation, %	0.0		
Dry density, pcf			·
Specimen diameter, in	1.98		
Specimen height, in	4.09	art.	
Description: LT. GRAY MED. GRAINED	SANDSTONE		*

PI = GS = 2.75Type: ROCK

Project No.: C00553

Date: 03/01/01

Remarks:

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-B

DEPTH: 82.6' - 83.0'

UNCONFINED COMPRESSION TEST

TRIAD ENGINEERING, INC.

Fig No.



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT No. C0055	3	DATE: _	2/16/01				
PROJECT NAME: Big Big	ranch Slurry Impou	ndment					
CORE No. DH2-1 (91.5'							
LENGTH (AFTER CAP) 3	#1:3.150	in.					
7	#2: <u>3.155</u>	in.	AVERAGE:_	3.153	in.		
7	#3: 3.155	in.					
DIAMETER #	#1: <u>1.980</u>	in.					
#	#2: <u>1.955</u>	in.	AVERAGE:	1.970	in.		
#	#3: <u>1.975</u>	in.	•				
LENGTH TO DIAMETER F	RATIO (L/D) 1.	60					
AREA: 3.05 in.	CORRECTION	FACTOR:	0.968				
LOAD: 4,050 lbs	<u> </u>	PSI:	1,330				
CORRECTED PSI: 1,290							
CORRECTED PSI: 1,290 REMARKS:							
TESTED BY: M. Ali Dast	tgheib CHE	CKED BY	: M. Ali	Dastgheib			



ST. ALBANS. LOGAN & MORGANTOWN. WEST VIRGINIA WINCHESTER & HARRISONBURG. VIRGINIA GREENSBURG. PENNSYLVANIA

PROJEC [*]	T No	C005	53			_ D/	ATE:_	2/16/01		
PROJEC ⁻	T NAME:_	Big	Brancl	h Slurry	' Impo	undm	ent			

LENGTH	(AFTER	CAP)	#1:	3.290			in.	-		
			#2:	3.295			in.	AVERAGE:_	3.293	in.
			#3:	3.295			in.	-		
	DIAM	ETER	#1:	1.980			in.	•		
			#2:	1.985			in.	AVERAGE:	1.985	in.
	•		#3:	1.990			in.			
LENGTH	TO DIAM	ETER	RATI	0 (L/D)	1.65				
AREA:	3.09	ir	.2	CORREC	TION	FAC	CTOR:	0.972		
LOAD:	11,750	Ιb	s	_			PSI:	3,800		
CORRECT	ED PSI:	3,6	90							
REMARKS	:									
					,			·		
TESTED	BY: M. A	Ali Da	stghe:	ib	СН	ECK	ED BY	/: <u>M. Ali D</u>	astgheib	



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJEC	T No	C005	553			D/	ATE: _	2/16/01		
	(AFTER									
			#2:	2.985			in.	AVERAGE:_	2.978	in.
	•			2.975						
	DIAN	METER	#1:	1.975			in.			
			#2:	1.980			in.	AVERAGE:_	1.977	in.
				1.975						
LENGTH	TO DIA	METER	RATI	0 (L/D)1.	.51				to a consequence
AREA:	3.07	in	ı. ²	CORREC	TION	FAC	TOR:	0.961		
	11,500							3, 750		
	; <u> </u>									
					· · · · · · · · · · · · · · · · · · ·					
TESTED	BY: M.	Ali Da	istghe	eib	СН	ECK	ED BY	. M. Ali	Dastghe	ib



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT No	C005	53	· · · · · · · · · · · · · · · · · · ·		_ D,	ATE: _	2/16/01		
PROJECT NAME	Big_	Branch	n Slurry	Impo	undm	ent			
CORE No. DH	3 - 3 (95.5	5 '- 95.	8')	TYPE	OF	CURE			
LENGTH (AFTE	R CAP)	#1:	3.400			in.	-		
		#2:	3.400			in.	AVERAGE:	3.403	in.
		#3:	3,405			in.			
DI	AMETER	#1:	1.980			in.			
		#2:	1.995			in.	AVERAGE:	1.988	in.
		#3:	1.990			in.			
LENGTH TO DI	AMETER	RATI	0 (L/D)1.	71				
AREA: 3.10	ir	1.2	CORREC	TION	FAG	CTOR:	0.977		
LOAD: 12,00)0 lb	s	-			PSI:	3,870		
CORRECTED PS	I: <u>3,7</u>	' 80				· · · · · · · · · · · · · · · · · · ·			
REMARKS:									
							A *		
							<u> </u>		· · · · · · · · · · · · · · · · · · ·
TESTED BY: N	1. Ali Da	stghe	ib	СН	ECK	ED BY	':M. A1	i Dastghe	ib



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJEC	T No	C005	53			DA	TE:_	2/16/01		
PROJEC	T NAME:	Big	Brancl	n Slurry	Impo	undme	ent			
CORE N	o. <u>DHP-1</u>	(91.3	3 '- 91.	5 ')	TYPE	OF	CURE			
LENGTH	(AFTER	CAP)	#1:	2.730			in.	_		
			#2:	2.735		ļ	in.	AVERAGE:_	2.728	in.
			#3:	2.720			'n.	-		
	DIAM	ETER	#1:	1.990	······································	i	'n.			
			#2:	1.985		i	n.	AVERAGE:	1.987	in.
			#3:	1.985		<u>i</u>	n.			
LENGTH	TO DIAM	METER	RATI	0 (L/D)	1.37				
AREA:	3.10	ir	.2	CORREC	TION	FAC	TOR:	0.944		
LOAD:_	13,050	Ιb	s	-	>	ļ	PSI:	4,210		
	S:									
TESTED	BY: M. /	Ali Da	stghe:	ib	СН	IECKE	D BY	∕: M. Ali	Dastghei	b



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT NoC005	53	_DATE:_	2/16/01				
PROJECT NAME: Big	Branch Slurry Impou	ndment					
CORE No. DHP-1 (96.6	'-96.9') TYPE	OF CURE					
LENGTH (AFTER CAP)	#1: <u>3.075</u>	in.					
	#2: _3.082	in.	AVERAGE:_	3.077	in.		
	#3: <u>3.075</u>	in.					
DIAMETER	#1: <u>2.000</u>	in.					
	#2: 1.990	in.	AVERAGE:	1.993	in.		
	#3: _1.990	in.					
LENGTH TO DIAMETER	RATIO (L/D) 1.	. 54					
AREA: 3.11 in							
LOAD: 13,050 It							
CORRECTED PSI: 4,04	40						
REMARKS:							
					•		
TESTED BY: M. Ali Da	astgheib CHE	CKED BY	': _ M. Ali	Dastgheib			



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT No. C005	553	_ DATE: _	2/16/01		
PROJECT NAME: Big	Branch Slurry Impou	ındment			
CORE No. DHP-1 (97.5					
LENGTH (AFTER CAP)	#1: 3.790	in.			
	#2: _3.800	in.	AVERAGE:	3.797	in.
	#3: <u>3.800</u>	in.			
DIAMETER	#1:2_000	in.			
	#2:2.005	in.	AVERAGE:	1.998	in.
	#3: 1.990	in.			
LENGTH TO DIAMETER	RATIO (L/D) 1.	900			
AREA: 3.13 in	correction	FACTOR:	0.996		
LOAD: 9,250 Ib	os	PSI:	2,955		
CORRECTED PSI: 2,	940				
REMARKS:					
-					
TESTED BY: M. ALi Das	stgheib CHE	ECKED BY	M. Ali	Dastgheib	



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

PROJECT NoC0055	53	_ DATE: _	2/16/01				
PROJECT NAME: Big B	ranch Slurry Impou	indment					
LENGTH (AFTER CAP)	#1: <u>3.450</u>	<u>in.</u>					
	#2: <u>3.455</u>	in.	AVERAGE: 3.456 in.				
	#3: <u>3.457</u>	in.					
DIAMETER	#1: <u>1.980</u>	in.					
	#2: <u>1.980</u>	in.	AVERAGE: 1.980 in.				
	#3: <u>1.980</u>	in.					
LENGTH TO DIAMETER	RATIO (L/D)	1.74					
AREA: 3.08 in.	2 CORRECTION	FACTOR:	0.979				
LOAD: 15,000 lbs	<u>s</u>	PSI:	4,870				
CORRECTED PSI: 4,77	CORRECTED PSI: 4,770						
REMARKS:							
	,						
TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib							

TRIAD ENGINEERING, INC. 4980 TEAYS VALLEY ROAD P.O. BOX 1435 ST.ALBANS, WV 25177 PHONE No. (304) 755-0721 FAX. No. (304) 755-1880



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. COOS	53		_DATE:_	2/16/01		
PROJECT NAME: Big	Branch Sl	lurry Impou	ındment			
CORE No. DHX-3 (91.6						
LENGTH (AFTER CAP)	#1: <u>4.</u>	500	in.	-		
	#2: <u>4</u> .	.510	in.	AVERAGE:_	4.502	in.
	#3: <u>4.</u>	.497	in.			
DIAMETER	#1: <u>1.</u>	.985	in.			
	#2: <u>1</u> .	950	in.	AVERAGE:	1.974	in.
	#3: <u>1.</u>	.987	in.			
LENGTH TO DIAMETER	RATIO (L/D) 2.2	8			
AREA: 3.06 ir	1. ² COF	RRECTION	FACTOR:	1		
LOAD: 9,500 II	os		PSI:	3,100		
CORRECTED PSI: 3,1						
REMARKS:						
						-
TESTED BY: M. Ali D	astgheib	СН	ECKED BY	: M. Ali	Dastgheib	-

TRIAD ENGINEERING, INC. 4980 TEAYS VALLEY ROAD P.O. BOX 1435 ST.ALBANS, WV 25177 PHONE No. (304) 755-0721 FAX. No. (304) 755-1880



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA WINCHESTER & HARRISONBURG, VIRGINIA GREENSBURG, PENNSYLVANIA

ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. COOS	53	DATE:			
PROJECT NAME: Big					
CORE No. DHX-3 (93					
LENGTH (AFTER CAP)					
	#2: <u>3.965</u>	<u>in.</u> AV	ERAGE:	3.957	in.
	#3: 3.955				
DIAMETER	#1: 1.975	in.			
,	#2:1.975	in. AV	ERAGE:	1.975	in.
	#3:1.995				
LENGTH TO DIAMETER	RATIO (L/D) 2.	00			
AREA: 3.06 in					
LOAD: 10,000 Ib	<u>s</u>	PSI:	3,270		·
CORRECTED PSI: 3,2	70				
REMARKS:					
TESTED BY: M. Ali D	astgheib CHE	CKED BY:	M. Ali Das	stgheib	

MODULUS OF RUPTURE

PROJECT NO.: COO	553 PR	OJECT NAME: Big	Branch Slurry	<u>Impoundment</u>
BORING NO.: DH1-	3 DEPTH	[:84.2 '- 85.0 '		
DESCRIPTION: Brow	n sandstone, me	dium grained	***************************************	
DATE: 2/14/01	TESTED BY: M.	.A. Dastgheib		
	$R_{o} = \frac{8F_{c} I}{\pi D^{3}}$	• 		
LOAD $(F_c) = 350$	lbs			
LENGTH (L) =4.1	90 in.			
DIAMETER (D) = 1.9	75in			
		•		
MODULUS OF RUPTU	RE = 485	(PSI)		

PROJECT NO.: C00553	_PROJECT NAME: Big	Branch Slurry Impoundmen
BORING NO.: DH1-3 DI	EPTH: 85.4'-86.0'	
DESCRIPTION: Brown and gray	sandstone, medium gra	ained
DATE: 2/14/01 TESTED BY	Y: M.A. Dastgheib	
$R_{o} = -$	8F _c L π D ³	
LOAD $(F_c) = 1b$	s	
LENGTH (L) = $\frac{4.190}{\text{in}}$ in.		
DIAMETER (D) = 1.975 in		
MODULUS OF BUILDING -	3//6 (DCI)	

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry In	mpoundment
BORING NO.: DH1-4 DEPTH: 78.0'-78.7'	_
DESCRIPTION: Brown and gray sandstone, medium grained	
DATE: 2/14/01 TESTED BY: M.A. Dastgheib	
$R_{o} = \frac{8F_{c} L}{\pi D^{3}}$	
$LOAD (F_c) = \underline{200} lbs$	
LENGTH (L) = 4.190 in.	
DIAMETER (D) = 1.965 in	
MODULUS OF RUPTURE = (PSI)	

PROJECT NO.:_	C00553	РКОЛ	ECT NAME: Big	Branch Slurry	Impoundment
BORING NO.:	DH1-4	_DEPTH:	<u>94.0'-84.5'</u>		*****
DESCRIPTION:_	Brown sands	stone, medi	um grained		 `
DATE: 2/14/01	TESTEL	BY: M.A.	Dastgheib		
	R_{o}	8F _c L = π D ³			
LOAD (F _c) =	280	_lbs			
LENGTH (L) =	4.190	_in.			
DIAMETER (D) =	1.975	_ in			
MODULUS OF RU	JPTURE =	388	_ (PSI)		

PROJECT NO.:	C00553	PROJE	ECT NAME: Big	Branch Slurry	Impoundmen
BORING NO.:	DH1-5	_DEPTH:	82.0'-82.5'		*****
DESCRIPTION:_	Brown sands	tone, medi	um grained		_
DATE: 2/14/01	TESTED	BY: M.A.	Dastgheib		
	Ro	8F _c L = π D ³			
LOAD $(F_c) = $	250	_lbs	•		
LENGTH (L) =	4.190	in.			
DIAMETER (D) =_	1.970	_ in			

MODULUS OF RUPTURE = 249 (PSI)

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry In	ıpoundment
BORING NO.: DH1-5 DEPTH: 84.0'-84.6'	·
DESCRIPTION: Gray sandstone, medium grained	
DATE: 2/14/01 TESTED BY: M.A. Dastgheib	
$R_{O} = \frac{8F_{c} L}{\pi D^{3}}$	
$LOAD (F_c) = \underline{200} lbs$	
LENGTH (L) = 4.190 in.	
DIAMETER (D) = 1.980 in	
MODULUS OF RUPTURE = 275 (PSI)	

PROJECT NO.:	C00553	PROJE	CT NAME: Big	Branch Slurry	Impoundment
BORING NO.:	DH1-8	_DEPTH:	79.5'-80.1'		·
DESCRIPTION:_	Gray sandst	one, medium	grained		
DATE: 2/14/01	TESTED	BY: M.A.	Dastgheib	·	
	R _o	$= \frac{8F_c L}{\pi D^3}$			
LOAD (F _c) =	250	_lbs			
LENGTH (L) =	4.190	_in.			
DIAMETER (D) =	1.980	in			
	•				
MODULUS OF RU	JPTURE =	344	_(PSI)		

PROJECT NO.: <u>C00553</u>	PROJECT NAME: Big Branch Slurry Impoundment
BORING NO.: DH1-8 DE	EPTH: 83.0'-83.8'
DESCRIPTION: Gray sandstone	, medium grained
DATE: 2/14/01 TESTED BY	Y: M.A. Dastgheib
$R_0 = -$	8F _c L π D ³
LOAD (F _c) =lbs	
LENGTH (L) = 4.190 in.	
DIAMETER (D) = 1.980 in	
MODULUS OF RUPTURE =	398 (PSI)

APPENDIX B

CHEMICAL ANALYSIS OF SELECTED SLURRY SAMPLES

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-006

Page 1

CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix WATER

Sampled by CLIENT

% Solids 71

032001 1358 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE							
ACRILAMIDE	79-06-1	ND	U 0.26	mg/L		03/19/01 23:26 ra	



CT&E Environmental Services Inc.

Laboratory Division

Laboratory Analysis Report

TRIAD ENGINEERING INC

MCCC BIG BRANCH IMPOUNDMENT

CT&E Laboratory Delivery Group Number: TA1-B0-P338 Page

DATE: 03/15/01

coc:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in an attached case narrative. Release of the data contained in the hard copy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

A case narrative is not required.

Reference	Sample Description	Sampled	<u>Laboratory Number</u>
DH 1-11 SLURRY SAMPLE 1-ME	SLURRY SAMPLE 1 96.1-97.1 FEET	12/14/2000	TA1-B0-P338-001
DH 2-9 SLURRY SAMPLE 5-ME	SLURRY BAG SAMPLE 5 97.8-100.1 FEET	01/18/2001	TA1-B0-P338-002
WOLF CREEK #1	1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT	01/06/2001	TA1-B0-P338-003
DH 2-9 SLURRY SAMPLE 2-ME	SLURRY BAG SAMPLE 2 91.8-93.8 FEET	01/18/2001	TA1-B0-P338-004
SP #5	100' UPSTREAM OF DRILL PAD 20'FROM SHORE	01/06/2001	TA1-B0-P338-005
CW #1	2000' UPSTREAM OF CONF. AT STRAIGHT FORK	01/06/2001	TA1-B0-P338-006

Submitted by,

Darris J. Holcomb

Project Manager

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page

DH 1-11 SLURRY SAMPLE 1-ME

SLURRY SAMPLE 1 96.1-97.1 FEET

COC

Date Sampled 12/14/00 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	F	lg RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	2700		19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
ANTIMONY	7440-36-0	ND	U		mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	
ARSENIC	7440-38-2	2.6		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	
BARIUM	7440-39-3	34		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	
BERYLLIUM	7440-41-7	0.65		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
BORON	7440-42-8	, ND	U	19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
CALCIUM	7440-70-2	640		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MIIM	7440-47-3	5.8		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
COSÁLT	7440-48-4	5.8		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
COPPER	7440-50-8	11		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
IRON	7439-89-6	16000		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
LEAD	7439-92-1	6.1		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MAGNESIUM	7439-95-4	1200		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MANGANESE	7439-96-5	230		1.9	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
NICKEL	7440-02-0	9.0		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
POTASSIUM	7440-09-7	650		190	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SELENIUM	7782-49-2	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SILICON	7440-21-3	1100		19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SILVER	7440-22-4	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SODIUM	7440-23-5	ND	U	190	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
THALLIUM	7440-28-0	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
TITANIUM	7440-32-6	45 .		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
VANAD I UM	7440-62-2	7.7		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
ZINC	7440-66-6	27		3.9	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
Total Solids (Percent)		77		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		es. a 1800		260	mg/Kg	Υ	02/20/01 14:44 TF	100
Alkalinity (Soluble)		640		260	mg/Kg	Y	02/20/01 14:44 TF	100
S''- LIBRARY SEARCH		ND	U			SW8270C	02/26/01 12:12 tjh	1.0
PHENOL	108-95-2	ND	Ü	2400	ug/Kg	Y SW8270C	02/26/01 12-12 +15	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2400	ug/Kg	Y SW8270C	•	1.0
		5	5	2400	49/ 79	1 3002/00	02/26/01 12:12 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page 2

DH 1-11 SLURRY SAMPLE 1-ME

SLURRY SAMPLE 1 96.1-97.1 FEET

COC

Date Sampled 12/14/00 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	Fl	lg RLimit	Units	S Method	Date/Time/Anl	DilF
2-CHLOROPHENOL	95-57-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1 0
1,3-DICHLOROBENZENE	541- <i>7</i> 3-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
1,4-DICHLOROBENZENE	106-46-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
1,2-DICHLOROBENZENE	95-50-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
2-METHYLPHENOL	95-48-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
3- & 4-METHYLPHENOL		ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4900	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
HEXACHLOROETHANE	67-72-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
)BENZENE	98-95-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
ISOPHORONE	78-59-1	ND	U	2400	ug/Kg	Y SW8270C		1.0
2-NITROPHENOL	88-75-5	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
2,4-DIMETHYLPHENOL	105-67-9	ND	υ	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2400	ug/Kg	Y SW8270C		1.0
HEXACHLOROBUTAD I ENE	87-68-3	ND	U	4900	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2400	ug/Kg	Y SW8270C		1.0
HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2400	ug/Kg	Y SW8270C	00.04.04.45.45	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2400	ug/Kg	Y SW8270C	00:04:04:45:45	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U.	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
2-CHLORONAPHTHALENE	91-58-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C		1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2400	ug/Kg	Y SW8270C		1.0
ACENAPHTHYLENE	208-96-8	ND	U	2400	ug/Kg	Y SW8270C	00.004.004.00.40	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2400	ug/Kg	Y SW8270C		1.0
3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
ACENAPHTHENE	83-32-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
2,4-DINITROPHENOL	51-28-5	ND	U.	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
4-NI TROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
DIBENZOFURAN	132-64-9	ND	U	2400	ug/Kg	Y SW8270C		1.0
? DINITROTOLUENE	121-14-2	ND	U	2400	ug/Kg	Y SW8270C		1.0
C	84-66-2	ND	U	2400	ug/Kg	Y SW8270C		1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2400	ug/Kg	Y SW8270C		1.0
FLUORENE	86-73-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	
					-			. • •

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page

DH 1-11 SLURRY SAMPLE 1-ME

SLURRY SAMPLE 1 96.1-97.1 FEET

COC

Date Sampled 12/14/00 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	F	lg RLimit	Units		S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	U	12000	ug/Kg			00/0//04//0	
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	u	12000	ug/Kg		Y SW8270C Y SW8270C		
N-NITROSODIPHENYLAMINE	86-30-6	ND	u	2400	ug/Kg		7 SW8270C	//01 12:12 ()[
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2400	ug/Kg		Y SW8270C	02/26/01 12:12 tjh	
HEXACHLOROBENZENE	118-74-1	ND	U	2400	ug/Kg		Y SW8270C	02/26/01 12:12 tjh	
PENTACHLOROPHENOL	87-86-5	ND	Ü	12000	ug/Kg		SW8270C	02/26/01 12:12 tjh	
PHENANTHRENE	85-01-8	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
J-BUTYLPHTHALATE	84-74-2	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2400	ug/Kg		' SW8270C	02/26/01 12:12 tjh	1.0
PYRENE	129-00-0	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	υ	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4900	ug/Kg		SW8270C		1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
CHRYSENE	218-01-9	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh 02/26/01 12:12 tjh	
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2400	ug/Kg		SW8270C	00.404.404.40	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
BENZO(A)PYRENE	50-32-8	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U.	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
DIBENZO(A, H) ANTHRACENE	53-70-3	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
BENZYL ALCOHOL	100-51-6	ND	U	2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
BENZOIC ACID	65-85-0	ND	U.	2400	ug/Kg		SW8270C	00 10 (104 15 15 15	
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2400	ug/Kg		SW8270C	00/0//04 /0 /0	1.0
SURROGATE RESULTS					-0, 13	•	0.02700	02/20/01 12:12 tjn	1.0
NITROBENZENE-D5	4165-60-0	6200		2400	ug/Kg	Y	SW8270C	02/26/01 12:12 tjh	1.0
NITROBENZENE-D5	4165-60-0	25			% REC		SW8270C	02/26/01 12:12 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	13000		2400	ug/Kg		SW8270C	02/26/01 12:12 tjh	
2-FLUOROBIPHENYL	321-60-8	55			% REC		SW8270C	00.104.04.40.40	
TERPHENYL-D14	1718-51-0	15000		2400	ug/Kg		SW8270C	02/2//04 45 45	1.0
TERPHENYL-D14	1718-51-0	62			% REC		SW8270C		1.0
10L-D5	4165-62-2	13000			ug/Kg		SW8270C	02/26/01 12:12 tjh	
-NOL-D5	4165-62-2	54			% REC		SW8270C	02/26/01 12:12 tjh	
2-FLUOROPHENOL	367-12-4	13000			ug/Kg		SW8270C	02/26/01 12:12 tjh	
2-FLUOROPHENOL	367-12-4	55			% REC		SW8270C	02/26/01 12:12 tjh 02/26/01 12:12 tjh	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page

DH 1-11 SLURRY SAMPLE 1-ME

SLURRY SAMPLE 1 96.1-97.1 FEET

Date Sampled 12/14/00 00:00

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Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL 2,4,6-TRIBROMOPHENOL	118-79-6 118-79-6	7700 32	2400	ug/Kg % REC		02/26/01 12:12 tjh 02/26/01 12:12 tjh	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-001

Page

DH 1-11 SLURRY SAMPLE 1-ME

SLURRY SAMPLE 1 96.1-97.1 FEET

COC

Date Sampled 12/14/00 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE Sampled by CLIENT

% Solids 77

032001 1358 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	•	imit Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U 0.2			03/19/01 21:58 ra	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 1

DH 2-9 SLURRY SAMPLE 5-ME

SLURRY BAG SAMPLE 5 97.8-100.1 FEET

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	2800		19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
ARSENIC	7440-38-2	2.9		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
BARIUM	7440-39-3	58		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
BERYLLIUM	7440-41-7	0.62		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
BORON	7440-42-8	ND	U	19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
CADMIUM	7440-43-9	ND	U	0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
CAI CIUM	7440-70-2	780		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
,;MIUM	7440-47-3	5.1		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
COBALT	7440-48-4	5.6		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	
COPPER	7440-50-8	12		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
IRON	7439-89-6	10000		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
LEAD	7439-92-1	7.6		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MAGNESIUM	7439-95-4	1300		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MANGANESE	7439-96-5	190		1.9	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
NICKEL	7440-02-0	8.9		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
POTASSIUM	7440-09-7	830		190	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SELENIUM	7782-49-2	1.0		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SILICON	7440-21-3	1200		19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SILVER	7440-22-4	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SODIUM	7440-23-5	ND	υ	190	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
THALLIUM	7440-28-0	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
TITANIUM	7440-32-6	50		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
VANADIUM	7440-62-2	8.0		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
ZINC	7440-66-6	28		3.8	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
Total Solids (Percent)		78		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		3600		250	mg/Kg	Υ	02/20/01 14:44 TF	100
Alkalinity (Soluble)		890		250	mg/Kg	Y	02/20/01 14:44 TF	100
LIBRARY SEARCH		ND	U			sw8270c	02/26/01 13:06 tjh	1.0
PHENOL	108-95-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
•	·	-	•		~3/ N3	. 5#52706	02/20/01 13:00 tjn	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

age 2

DH 2-9 SLURRY SAMPLE 5-ME

SLURRY BAG SAMPLE 5 97.8-100.1 FEET

Date Sampled 01/18/01 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	F	lg RLimit	t Units	S Method	Date/Time/Anl	DilF
2-CHLOROPHENOL	95-57-8	ND	U	2300	ug/Kg	Y SW82700	02/26/01 13:06 tjh	
1,3-DICHLOROBENZENE	541-73-1	ND	U	2300	ug/Kg	Y SW82700		
1,4-DICHLOROBENZENE	106-46-7	ND	Ū	2300	ug/Kg	Y SW82700		1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2300	ug/Kg	Y SW82700		
2-METHYLPHENOL	95-48-7	ND	U	2300	ug/Kg	Y SW82700	-	1.0
3- & 4-METHYLPHENOL		ND	U	2300	ug/Kg	Y SW82700		1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4600	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HFYACHLOROETHANE	67-72-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
OBENZENE	98-95-3	ND	Ü	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2300	ug/Kg	Y SW8270C	00.404.404.40.44	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0 1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0 1.0
NAPHTHALENE	91-20-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
HEXACHLOROBUTAD I ENE	87-68-3	ND	U	4600	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
2-CHLORONAPHTHALENE	91-58-7	ND	U	2300	ug/Kg	Y SW8270C	00.004.004.45.00	1.0
2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C	00.04.04.45.45.4	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2300	ug/Kg	Y SW8270C		1.0
3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2300	ug/Kg	Y SW8270C	00.404.404.40	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
4-NITROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C	00.004.04.47.44.44	1.0
DIBENZOFURAN	132-64-9	ND	U	2300	ug/Kg	Y SW8270C	AB 181 1A1 1m 11	1.0
DINITROTOLUENE	121-14-2	ND	U	2300	ug/Kg	Y SW8270C	00.004.04.45.45.45	
L. HYLPHTHALATE	84-66-2	ND	U	2300	ug/Kg	Y SW8270C	00.004.04.05	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2300	ug/Kg	Y SW8270C		
FLUORENE	86-73-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
					-3,3	. 5452700	02/20/01 13:00 tjn	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

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DH 2-9 SLURRY SAMPLE 5-ME

SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	F	g RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	U	12000	ug/Kg	Y SW82700	02/26/01 13:06 tjh	1 0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	12000	ug/Kg	Y SW82700		
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2300	ug/Kg	Y SW82700		
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2300	ug/Kg	Y SW82700		1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2300	ug/Kg	Y SW82700		1.0
PENTACHLOROPHENOL	87-86-5	ND	U	12000	ug/Kg	Y SW82700		1.0
PHENANTHRENE	85-01-8	3300		2300	ug/Kg	Y SW82700		
ANTHRACENE	120-12-7	ND	U	2300	ug/Kg	Y SW82700		1.0
-BUTYLPHTHALATE	84-74-2	ND	U	2300	ug/Kg	Y SW82700		1.0
FLUORANTHENE	206-44-0	6300		2300	ug/Kg	Y SW82700		1.0
PYRENE	129-00-0	5100		2300	ug/Kg	Y SW8270C		1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2300	ug/Kg	Y SW8270C	-	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4600	ug/Kg	Y SW8270C		1.0
BENZO(A)ANTHRACENE	56-55-3	3100		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
CHRYSENE	218-01-9	3200		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
BENZO(B) FLUORANTHENE	205-99-2	2900		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0 1.0
BENZO(K) FLUORANTHENE	207-08-9	2700		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DIBENZO(A, H)ANTHRACENE	53-70-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
BENZO(G,H,I)PERYLENE	191-24-2	2500		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
BENZYL ALCOHOL	100-51-6	ND	u	2300	ug/Kg	Y SW8270C	00/0//04 45 44	
BENZOIC ACID	65-85-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2300	ug/Kg	Y SW8270C	00.104.104.15.44	1.0
SURROGATE RESULTS					-3/ N3	1 3#52/00	02/20/01 13:06 tjn	1.0
NITROBENZENE-D5	4165-60-0	5400		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	4.0
NITROBENZENE-D5	4165-60-0	23			% REC	Y SW8270C	02/26/01 13:06 tjh	
2-FLUOROBIPHENYL	321-60-8	14000		2300	ug/Kg	Y SW8270C	-	
2-FLUOROBIPHENYL	321-60-8	62		2500	% REC	Y SW8270C	02/26/01 13:06 tjh	
TERPHENYL-D14	1718-51-0	16000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
TERPHENYL-D14	1718-51-0	68			% REC	Y SW8270C	02/26/01 13:06 tjh	
F 'OL-D5	4165-62-2	15000		2300	ug/Kg		02/26/01 13:06 tjh	
LOL-D5	4165-62-2	65		2300	% REC	Y SW8270C	02/26/01 13:06 tjh	
2-FLUOROPHENOL	367-12-4	15000		2300		Y SW8270C	02/26/01 13:06 tjh	
2-FLUOROPHENOL	367-12-4	64		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	
	301 12 4	04			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 4

DH 2-9 SLURRY SAMPLE 5-ME

SLURRY BAG SAMPLE 5 97.8-100.1 FEET

coc

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL 2,4,6-TRIBROMOPHENOL	118-79-6 118-79-6	11000 48	2300	ug/Kg % REC		02/26/01 13:06 tjh 02/26/01 13:06 tjh	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-002

Page

DH 2-9 SLURRY SAMPLE 5-ME SLURRY BAG SAMPLE 5 97.8-100.1 FEET

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Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 78

032001 1358 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	•	RLimit		S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.25	mg/L		03/19/01 22:36 ra	1.0

John Meeks TRIAD ENGINEERING INC Laboratory Number TA1-B0-P338-003

Page 1

WOLF CREEK #1

1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

Date Sampled 01/06/01 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

							•	
Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	4800		22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	
ARSENIC	7440-38-2	4.6		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	
BARIUM	7440-39-3	170		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
BERYLLIUM	7440-41-7	1.2		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
BORON	7440-42-8	ND	U	22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	
CADMIUM	7440-43-9	ND	U	0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
CALCIUM	7440-70-2	1400		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MIUM	7440-47-3	9.1		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
COBALT	7440-48-4	7.5		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
COPPER	7440-50-8	28		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
IRON	7439-89-6	10000		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
LEAD	7439-92-1	14		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MAGNESIUM	7439-95-4	2100		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MANGANESE	7439-96-5	92		2.2	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
NICKEL	7440-02-0	16		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
POTASSIUM	7440-09-7	1700		220	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SELENIUM	7782-49-2	3.1		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SILICON	7440-21-3	1400		22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SILVER	7440-22-4	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SODIUM	7440-23-5	ND	U	220	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
TITANIUM	7440-32-6	130		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
VANADIUM	7440-62-2	16		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
ZINC	7440-66-6	35		4.4	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
Total Solids (Percent)		68		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		7600		300	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1600		300	mg/Kg	Y	02/20/01 14:44 TF	100
* adecane	629-59-4	1900	J		ug/Kg	SW8270C	02/26/01 14:00 tjh	1.0
Nthalene, 1-hexyl-	2876-53-1	2100	J		ug/Kg	SW8270C		1.0
Naphthalene, 1,6-dimethyl-	575-43-9	1900	J		ug/Kg	SW8270C		
Heptane, 2,6-dimethyl-	1072-05-5	2000	J		ug/Kg	SW8270C		1.0
,			•		-3/ /3	3#02/06	02/26/01 14:00 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

Page 2

WOLF CREEK #1

1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

Date Sampled 01/06/01 00:00 Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fi	lg RLimit	Units	S Method	Date/Time/Anl	DilF
PHENOL	108-95-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	
2-CHLOROPHENOL	95-57-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0 1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	
7- & 4-METHYLPHENOL		ND	U	2700	ug/Kg		02/26/01 14:00 tjh	1.0 1.0
ITROSODI-N-PROPYLAMINE	621-64-7	ND	υ	5400	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLOROETHANE	67-72-1	ИD	U	2700	ug/Kg		02/26/01 14:00 tjh	1.0
NITROBENZENE	98-95-3	ND	U	2700	ug/Kg			1.0
ISOPHORONE	78-59-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2700	ug/Kg		02/26/01 14:00 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2700	ug/Kg		02/26/01 14:00 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2700	ug/Kg		02/26/01 14:00 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	Ū	2700	ug/Kg		A	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	Ū	2700	ug/Kg			1.0
NAPHTHALENE	91-20-3	ND	U	2700	ug/Kg			1.0
4-CHLOROANILINE	106-47-8	ND	υ	2700	ug/Kg			1.0
HEXACHLOROBUTAD I ENE	87-68-3	ND	U	5400	ug/Kg			1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	υ	2700	ug/Kg			1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2700	ug/Kg			1.0
HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2700	ug/Kg			1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2700	ug/Kg			
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2700	ug/Kg			1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2700	ug/Kg			1.0
2-NITROANILINE	88-74-4	ND	U	13000	ug/Kg		***************************************	1.0 1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2700	ug/Kg			1.0
ACENAPHTHYLENE	208-96-8	ND	U	2700	ug/Kg			1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2700	ug/Kg			1.0
3-NITROANILINE	99-09-2	ND	U	13000	ug/Kg			
ACENAPHTHENE	83-32-9	ND	U	2700	ug/Kg			1.0
2,4-DINITROPHENOL	51-28-5	ND	U	13000	ug/Kg			1.0
TROPHENOL	100-02-7	ND	U	13000	ug/Kg			1.0
LENZOFURAN	132-64-9	ND	U	2700	ug/Kg		•	1.0
2,4-DINITROTOLUENE	121-14-2	ND	U	2700	ug/Kg		•	1.0
DIETHYLPHTHALATE	84-66-2	ND	U	2700			•	1.0
		110	Ū	2100	ug/Kg	Y SW8270C (02/26/01 14:00 tjh	1.0

John Meeks TRIAD ENGINEERING INC Laboratory Number TA1-B0-P338-003

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WOLF CREEK #1

1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

Date Sampled 01/06/01 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	F	lg RLimit	Units	S Method	Date/Time/Anl	DilF
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
FLUORENE	86-73-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-NITROANILINE	100-01-6	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ANTHRENE	85-01-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DI-N-BUTYLPHTHALATE	84-74-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PYRENE	129-00-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	5400	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
CHRYSENE	218-01-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2700	ug/Kg	Y SW8270C		1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DIBENZO(A, H)ANTHRACENE	53-70-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZOIC ACID	65-85-0	ND	υ	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	6300		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
NITROBENZENE-D5	4165-60-0	24			% REC	Y SW8270C	*****	1.0
2-FLUOROBIPHENYL	321-60-8	9500		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	35			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0
* YENYL-D14	1718-51-0	10000		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HENYL-D14	1718-51-0	38			% REC	Y SW8270C		1.0
PHENOL-D5	4165-62-2	11000		2700	ug/Kg	Y SW8270C	00.01.01.11.00	
PHENOL-D5	4165-62-2	40		2.44	% REC	Y SW8270C		1.0
							,,, 14.00 cjii	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

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WOLF CREEK #1

1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F

Matrix SLUDGE

Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
2-FLUOROPHENOL 2-FLUOROPHENOL 2,4,6-TRIBROMOPHENOL 2,4,6-TRIBROMOPHENOL	367-12-4 367-12-4 118-79-6 118-79-6	10000 38 6500 24	2700 2700	ug/Kg % REC ug/Kg % REC	Y SW8270C Y SW8270C Y SW8270C Y SW8270C	02/26/01 14:00 tjh 02/26/01 14:00 tjh 02/26/01 14:00 tjh 02/26/01 14:00 tjh	1.0 1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-003

Page

WOLF CREEK #1

1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 68

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	_	RLimit		S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.26	mg/L		03/19/01 22:48 ra	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page 1

DH 2-9 SLURRY SAMPLE 2-ME

SLURRY BAG SAMPLE 2 91.8-93.8 FEET

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	3600		20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
ARSENIC	7440-38-2	5.0		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
BARIUM	7440-39-3	140		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
BERYLLIUM	7440-41-7	1.1		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
BORON	7440-42-8	ND	U	20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
CADMIUM	7440-43-9	ND	U	0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
CALCIUM	7440-70-2	1200		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
1IUM	7440-47-3	11		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
COBALT	7440-48-4	7.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
COPPER	7440-50-8	26		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
IRON	7439-89-6	9100		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	
LEAD	7439-92-1	13		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
MAGNESIUM	7439-95-4	1400		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
MANGANESE	7439-96-5	68		2.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
NICKEL	7440-02-0	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
POTASSIUM	7440-09-7	1300		200	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
SELENIUM	7782-49-2	4.5		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
SILICON	7440-21-3	1300		20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
SILVER	7440-22-4	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
SODIUM	7440-23-5	ND	Ų	200	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
TITANIUM	7440-32-6	170		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
VANADIUM	7440-62-2	26		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
ZINC	7440-66-6	29		4.1	mg/Kg	Y SW6010B	02/21/01 03:08 JWJ	1.0
Total Solids (Percent)		74		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		7200		270	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1000		270	mg/Kg	Y	02/20/01 14:44 TF	100
N thalene, 1,3-dimethyl-	575-41-7	2200	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Nchalene, 1,5-dimethyl-	571-61-9	4000	J		ug/Kg	SW8270C		1.0
Octadecane, 2,6-dimethyl-	75163-97-2	6900	j		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Naphthalene, 1-methyl-7-(1-methylethyl)	490-65-3	4400	J		ug/Kg	SW8270C		1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page

THE ENGINEERING THE

DH 2-9 SLURRY SAMPLE 2-ME

SLURRY BAG SAMPLE 2 91.8-93.8 FEET

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

	Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
	Eicosane	112-95-8	2300	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
	Heptadecane, 4-methyl-	26429-11-8	2200	j		ug/Kg	SW8270C	02/26/01 14:53 tjh	
	Tetracosane	646-31-1	27000	j		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
1	PHENOL	108-95-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1	BIS(2-CHLOROETHYL)ETHER	111-44-4	ND .	U	2000	ug/Kg	Y SW8270C		1.0
;	2-CHLOROPHENOL	95-57-8	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
	1.3-DICHLOROBENZENE	541-73-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
•) I CHLOROBENZENE	106-46-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
	1,2-DICHLOROBENZENE	95-50-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2	2-METHYLPHENOL	95-48-7	ND	U	2000	ug/Kg	Y SW8270C		1.0
3	3- & 4-METHYLPHENOL		ND	U	2000	ug/Kg	Y SW8270C		1.0
1	N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4000	ug/Kg	Y SW8270C		1.0
1	HEXACHLOROETHANE	67-72-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
!	NITROBENZENE	98-95-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1	ISOPHORONE	78-59-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tih	
2	2-NITROPHENOL	88-75-5	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2	2,4-DIMETHYLPHENOL	105-67-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
E	BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2	2,4-DICHLOROPHENOL	120-83-2	ND	Ų	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1	1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
٨	NAPHTHALENE	91-20-3	4100		2000	ug/Kg	Y SW8270C		1.0
4	4-CHLOROANILINE	106-47-8	3800		2000	ug/Kg	Y SW8270C		1.0
H	HEXACHLOROBUTAD I ENE	87-68-3	ND	U	4000	ug/Kg	Y SW8270C		1.0
4	-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2000	ug/Kg	Y SW8270C		1.0
2	2-METHYLNAPHTHALENE	91-57-6	5900		2000	ug/Kg	Y SW8270C		1.0
H	HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2	2,4,6-TRICHLOROPHENOL	88-06-2	· ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2	2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2	2-CHLORONAPHTHALENE	91-58-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2	?-NITROANILINE	88-74-4	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
D	IMETHYLPHTHALATE	131-11-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
Α	CENAPHTHYLENE	208-96-8	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2	PINITROTOLUENE	606-20-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
3	ROANILINE	99-09-2	ND	Ū	10000	ug/Kg	Y SW8270C		1.0
Α	CENAPHTHENE	83-32-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2	2,4-DINITROPHENOL	51-28-5	ND	U	10000	ug/Kg	Y SW8270C		1.0

John Meeks TRIAD ENGINEERING INC Laboratory Number TA1-B0-P338-004

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SLURRY BAG SAMPLE 2 91.8-93.8 FEET

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

DH 2-9 SLURRY SAMPLE 2-ME

Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

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Analyzed Parameter	CAS No.	Result	FI	lg RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROPHENOL	100-02-7	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1 0
DIBENZOFURAN	132-64-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2,4-DINITROTOLUENE	. 121-14-2	ND	υ	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIETHYLPHTHALATE	84-66-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tih	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
FLUORENE	86-73-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-NITROANILINE	100-01-6	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4 6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
TROSODIPHENYLAMINE	86-30-6	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PHENANTHRENE	85-01-8	2800		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DI-N-BUTYLPHTHALATE	84-74-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PYRENE	129-00-0	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(A)ANTHRACENE	56-55 - 3	. ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
CHRYSENE	218-01-9	ND .	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2000	ug/Kg	Y SW8270C	00.004.04.44.55	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2000	ug/Kg	Y SW8270C	20.004.04.44.55	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2000	ug/Kg	Y SW8270C		1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIBENZO(A, H)ANTHRACENE	53-70-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2000	ug/Kg	Y SW8270C		1.0
BENZYL ALCOHOL	100-51-6	ND	U	2000	ug/Kg	Y SW8270C	00.004.04.44.55	1.0
BENZOIC ACID	65-85-0	ND	U	2200	ug/Kg	Y SW8270C	00/0//04 44 55	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2000	ug/Kg	Y SW8270C	A	1.0
SURROGATE RESULTS							02/20/01 14:55 1/1	1.0
P OBENZENE-D5	4165-60-0	8200		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
N DBENZENE-D5	4165-60-0	40			% REC	Y SW8270C		1.0
2-FLUOROBIPHENYL	321-60-8	13000		2000	ug/Kg	Y SW8270C	00.104.104.14. ==	
2-FLUOROBIPHENYL	321-60-8	65			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0
	-				73 KLU	1 3HUZ/UL	02/20/01 14:03 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

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DH 2-9 SLURRY SAMPLE 2-ME

SLURRY BAG SAMPLE 2 91.8-93.8 FEET

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
TERPHENYL-D14	1718-51-0	16000	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
TERPHENYL-D14	1718-51-0	78		% REC	Y SW8270C	02/26/01 14:53 tjh	
PHENOL-D5	4165-62-2	16000	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
PHENOL-D5	4165-62-2	79		% REC	Y SW8270C	02/26/01 14:53 tjh	
2-FLUOROPHENOL	367-12-4	15000	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2-FLUOROPHENOL	367-12-4	74		% REC	Y SW8270C	02/26/01 14:53 tjh	
2,4,6-TRIBROMOPHENOL	118-79-6	11000	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	
2 '.6-TRIBROMOPHENOL	118-79-6	55		% REC	Y SW8270C	02/26/01 14:53 tjh	

John Meeks

Laboratory Number TA1-C0-P271-004

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TRIAD ENGINEERING INC

DH 2-9 SLURRY SAMPLE 2-ME

SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC

Date Sampled 01/18/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 74

032001 1358 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	Flg RLimit			Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U 1.0	mg/L	Y SW8316	03/19/01 23:01 ra	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-005

Page '

SP #5

100' UPSTREAM OF DRILL PAD 20'FROM SHORE

Date Sampled 01/06/01 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	5900		22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
ARSENIC	7440-38-2	5.1		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
BARIUM	7440-39-3	150		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
BERYLLIUM	7440-41-7	0.91		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
BORON	7440-42-8	ND	U	22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
CADMIUM	7440-43-9	ND	U	0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
C., CINW	7440-70-2	1200		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
MUIM	7440-47-3	10		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
COBALT	7440-48-4	8.1		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
COPPER	7440-50-8	30		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
IRON	7439-89-6	12000		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
LEAD	7439-92-1	13		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MAGNESIUM	7439-95-4	2600		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MANGANESE	7439-96-5	97		2.2	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	บ	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
NICKEL	7440-02-0	18		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
POTASSIUM	7440-09-7	1500		220	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	
SELENIUM	7782-49-2	2.9		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SILICON	7440-21-3	1800		22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SILVER	7440-22-4	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SODIUM	7440-23-5	ND	U	220	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
TITANIUM	7440-32-6	120		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
VANADIUM	7440-62-2	17		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
ZINC	7440-66-6	43		4.3	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
Total Solids (Percent)		69		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		11000		290	mg/Kg	Υ ΄	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1100		290	mg/Kg	Υ	02/20/01 14:44 TF	100
[tane	112-40-3	2000	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
Naprithalene, 1-methyl-	90-12-0	2000	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
Naphthalene, 2,3-dimethyl-	581-40-8	2300	J		ug/Kg	SW8270C		1.0
Dodecane, 2-methyl-8-propyl-	55045-07-3	2600	J		ug/Kg	SW8270C		
• • • • • • • • • • • • • • • • • • • •		2000	٠		~a) ~a	3W0210C	02/26/01 15:47 tjh	1.0

John Meeks

Laboratory Number TA1-B0-P338-005

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TRIAD ENGINEERING INC

SP #5

coc

100' UPSTREAM OF DRILL PAD 20'FROM SHORE

Date Sampled 01/06/01 00:00
Date Received 02/13/01 11:00

Type F

Matrix SLUDGE

Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

Analyzed Parameter	CAS No.	Result	Fle	RLimit	Units	S Method	Date/Time/Anl	DilF
Octadecane	593-45-3	4900	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
PHENOL	108-95-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-CHLOROPHENOL	95-57-8	ND	U	2600	ug/Kg	Y SW8270C		1.0
1,3-DICHLOROBENZENE	541- <i>7</i> 3-1	ND	U	2600	ug/Kg	Y SW8270C	00.04.04.45	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1 ?-DICHLOROBENZENE	95-50-1	ND	U	2600	ug/Kg	Y SW8270C		1.0
iTHYLPHENOL	95-48-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	5200	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
NITROBENZENE	98-95-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2600	ug/Kg	Y SW8270C		1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2600	ug/Kg	Y SW8270C		1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2600	ug/Kg	Y SW8270C		1.0
NAPHTHALENE	91-20-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-CHLOROANILINE	106-47-8	2600		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
HEXACHLOROBUTAD I ENE	87-68-3	ND	U	5200	ug/Kg	Y SW8270C		1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2600	ug/Kg	Y SW8270C		1.0
2-METHYLNAPHTHALENE	91-57-6	3000		2600	ug/Kg	Y SW8270C		1.0
HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2600	ug/Kg	Y SW8270C		1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2600	ug/Kg	Y SW8270C		1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2600	ug/Kg	Y SW8270C		1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2600	ug/Kg	Y SW8270C	** .= * .* *	1.0
2-NITROANILINE	88-74-4	ND	U	13000	ug/Kg	Y SW8270C		1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2600	ug/Kg	Y SW8270C		1.0
ACENAPHTHYLENE	208-96-8	ND	U	2600	ug/Kg	Y SW8270C		1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2600	ug/Kg	Y SW8270C		1.0
3-NITROANILINE	99-09-2	ND	U	13000	ug/Kg	Y SW8270C		1.0
'APHTHENE	83-32-9	ND	U	2600	ug/Kg	Y SW8270C		1.0
DINITROPHENOL	51-28-5	ND	U	13000	ug/Kg	Y SW8270C		1.0
4-NITROPHENOL	100-02-7	ND	U	13000	ug/Kg	Y SW8270C		1.0
DIBENZOFURAN	132-64-9	ND	U	2600	ug/Kg	Y SW8270C		1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-005

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SP #5

100' UPSTREAM OF DRILL PAD 20'FROM SHORE

Date Sampled 01/06/01 00:00
Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
2,4-DINITROTOLUENE	121-14-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DIETHYLPHTHALATE	84-66-2	ND	U	2600	ug/Kg	Y SW8270C		
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2600	ug/Kg	Y SW8270C		
FLUORENE	86-73-7	ND	Ū	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
4-NITROANILINE	100-01-6	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tih	
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
CHLOROBENZENE	118-74-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
PHENANTHRENE	85-01-8	ND	U	2600	ug/Kg	Y SW8270C		1.0
ANTHRACENE	120-12-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
DI-N-BUTYLPHTHALATE	84-74-2	ND	Ü	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
FLUORANTHENE	206-44-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
PYRENE	129-00-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	5200	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZO(A)ANTHRACENE	56-55-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
CHRYSENE	218-01-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tih	
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZO(A)PYRENE	50-32-8	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
DIBENZO(A, H)ANTHRACENE	53-70-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZYL ALCOHOL	100-51-6	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
BENZOIC ACID	65-85-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tih	
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
SURROGATE RESULTS					.			1.0
NITROBENZENE-D5	4165-60-0	7000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
NITROBENZENE-D5	4165-60-0	27			% REC	Y SW8270C	02/26/01 15:47 tjh	
UOROBIPHENYL	321-60-8	14000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
LUOROB I PHENYL	321-60-8	53			% REC	Y SW8270C	02/26/01 15:47 tjh	
TERPHENYL-D14	1718-51-0	15000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
TERPHENYL-D14	1718-51-0	57			% REC	Y SW8270C	02/26/01 15:47 tjh	

John Meeks

TRIAD ENGINEERING INC

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SP #5

100' UPSTREAM OF DRILL PAD 20'FROM SHORE

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg RLimit	Units	S Method	Date/Time/Anl	DilF
PHENOL - D5	4165-62-2	18000	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PHENOL-D5	4165-62-2	70		% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
2-FLUOROPHENOL	367-12-4	14000	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
2-FLUOROPHENOL	367-12-4	54		% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	12000	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	
2,4,6-TRIBROMOPHENOL	118-79-6	48		% REC	Y SW8270C	02/26/01 15:47 tjh	

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TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-005

Page

CD #5

100' UPSTREAM OF DRILL PAD 20'FROM SHORE

COC Date Sampled 01/06/01 00:00

ate Sampled 01/00/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 69

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	_	Units	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND		 mg/L	03/19/01 23:14 ra	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

Page 1

CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

Date Sampled 01/06/01 00:00 Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	4800		21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ARSENIC	7440-38-2	4.5		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BARIUM	7440-39-3	170		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BERYLLIUM	7440-41-7	1.2		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BORON	7440-42-8	ND	U	21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
C., CINW	7440-70-2	1400		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MUIMC	7440-47-3	8.4		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
COBALT	7440-48-4	7.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
COPPER	7440-50-8	28		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
IRON	7439-89-6	9800		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
LEAD	7439-92-1	13	•	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MAGNESIUM	7439-95-4	2000		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MANGANESE	7439-96-5	100		2.1	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
NICKEL .	7440-02-0	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
POTASSIUM	7440-09-7	1700		210	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SELENIUM	7782-49-2	3.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SILICON	7440-21-3	2300		21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SILVER	7440-22-4	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SODIUM	7440-23-5	ND	U	210	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
TITANIUM	7440-32-6	100		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
VANADIUM	7440-62-2	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ZINC	7440-66-6	37		4.2	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
Total Solids (Percent)		71		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		6200		280	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1600		280	mg/Kg	Y	02/20/01 14:44 TF	100
radecane, 2,6,10,14-tetramethyl-	1921-70-6	2000	J		ug/Kg	SW8270C	02/26/01 16:40 tjh	1.0
PHENOL	108-95-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 14-/0 +:-	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2300	ug/Kg		02/26/01 16:40 tjh	
	111 77 7	NU	U	2300	ug/ kg	Y SW8270C	02/26/01 16:40 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

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CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

_	Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
	2-CHLOROPHENOL	95-57-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	1,3-DICHLOROBENZENE	541-73-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	1,4-DICHLOROBENZENE	106-46-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	1,2-DICHLOROBENZENE	95-50-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2-METHYLPHENOL	95-48-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	3- & 4-METHYLPHENOL		ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	HT. ACHLOROETHANE	67-72-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	JBENZENE	98-95-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	ISOPHORONE	78-59-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2-NITROPHENOL	88-75-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2,4-DIMETHYLPHENOL	105-67-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2,4-DICHLOROPHENOL	120-83-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	NAPHTHALENE	91-20-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	4-CHLOROANILINE	106-47-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	HEXACHLOROBUTAD I ENE	87-68-3	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2-METHYLNAPHTHALENE	91-57-6	2400		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	HEXACHLOROCYCLOPENTAD I ENE	77-47-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2-CHLORONAPHTHALENE	91-58-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	DIMETHYLPHTHALATE	131-11-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	ACENAPHTHYLENE	208-96-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	2,6-DINITROTOLUENE	606-20-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	ACENAPHTHENE	83-32-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tih	1.0
	2,4-DINITROPHENOL	51-28-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	4-NI TROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C		1.0
	DIBENZOFURAN	132-64-9	ND.	U	2300	ug/Kg	Y SW8270C		1.0
	INITROTOLUENE	121-14-2	ND	U	2300	ug/Kg	Y SW8270C		1.0
	DIETHYLPHTHALATE	84-66-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
	4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2300	ug/Kg	Y SW8270C		1.0
	FLUORENE	86-73-7	ND	U	2300	ug/Kg	Y SW8270C		1.0
						3,		,, 01 10170 ()11	

John Meeks

Laboratory Number TA1-B0-P338-006

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TRIAD ENGINEERING INC

CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Fl	g RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	Ü	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2300	ug/Kg	Y SW8270C		1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2300	ug/Kg	Y SW8270C		1.0
PENTACHLOROPHENOL	87-86-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PHENANTHRENE	85-01-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
A ¹ "RACENE	120-12-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
LBUTYLPHTHALATE	84-74-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PYRENE	129-00-0	ND	U	2300	ug/Kg	Y SW8270C		1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2300	ug/Kg	Y SW8270C		1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
CHRYSENE	218-01-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2300	ug/Kg	Y SW8270C		1.0
BENZO(B) FLUORANTHENE	205-99-2	ND	U	2300	ug/Kg	Y SW8270C		1.0
BENZO(K) FLUORANTHENE	207-08-9	ND	U	2300	ug/Kg	Y SW8270C	00.04.04.44.4	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	9600		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
NITROBENZENE-D5	4165-60-0	41			% REC	Y SW8270C		1.0
2-FLUOROBIPHENYL	321-60-8	10000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	
2-FLUOROBIPHENYL	321-60-8	42			% REC	Y SW8270C	02/26/01 16:40 tjh	
TERPHENYL-D14	1718-51-0	12000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	
TERPHENYL-D14	1718-51-0	52			% REC	Y SW8270C		1.0
P L-D5	4165-62-2	15000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	
PHENOL-D5	4165-62-2	64			% REC	Y SW8270C	02/26/01 16:40 tjh	
2-FLUOROPHENOL	367-12-4	12000		2300	ug/Kg	Y SW8270C		1.0
2-FLUOROPHENOL	367-12-4	53			% REC	Y SW8270C	02/26/01 16:40 tih	
							,, 01 10140 ()11	

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

Page

CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix SLUDGE

Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg RLimit	 S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL 2,4,6-TRIBROMOPHENOL	118-79-6 118-79-6	8700 37	2300	Y SW8270C	02/26/01 16:40 tjh 02/26/01 16:40 tjh	1.0

John Meeks

TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-006

Page

CW #1

2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC Date Sampled 01/06/01 00:00

Date Received 02/13/01 11:00

Type F Matrix WATER

Sampled by CLIENT

% Solids 71

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.		RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	 0.26	mg/L	Y SW8316	03/19/01 23:26 ra	1.0

APPENDIX C GEOPHYSICAL INVESTIGATION



Final Report
Geophysical Survey
Big Branch Slurry Impoundment
Martin County Coal Corporation
Martin County, KY
Enviroscan Reference Number 120015

Prepared For: Triad Engineering, Inc. Prepared By: Enviroscan, Inc. January 23, 2001



January 23, 2001

Mr. John Nottingham **Triad Engineering, Inc.**4980 Teays Valley Road
Scott Depot, WV 25560

RE: Geophysical Survey

Big Branch Slurry Impoundment Martin County Coal Corporation

Martin County, KY

Enviroscan Reference Number 120015

Dear Mr. Nottingham:

Pursuant to our proposal, dated December 11, 2000, Enviroscan, Inc. completed a geophysical survey of the above-referenced site between December 18 through 20, 2000. The methods and results of the survey are described in the following text and figures.

Survey Purpose

The geophysical survey area lies in a dammed valley that has been used by the Martin County Coal Corporation as a coal washing slurry impoundment. According to information provided by Triad Engineering, Inc. (Triad) and the Mine Safety and Health Administration (MSHA), the impoundment bottom failed, releasing semi-liquid coal slurry into nearby mine workings. The purpose of the geophysical survey was to determine whether there is geophysical evidence to constrain the location of the presumed conduit or breakthrough from the impoundment into the mine workings. The survey area consists of a recently constructed earthen drilling pad extending out into the slurry impoundment. The locations of selected recent boreholes (by others) within the survey area are depicted on Figure 1.

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Survey Method

Based on the site conditions and survey purpose, Enviroscan performed a mise-a-la-masse electrical profiling survey. The mise-a-la-masse method is commonly used in the mining industry to map the extent of conductive ore bodies. The principles of the mise-a-la-masse method are depicted in Appendix A, and are described in detail in e.g. Telford, W.M., Geldart, L.P., and Sheriff, R.E., 1990, Applied Geophysics, Cambridge University Press. The method is based on the idea that an electrically conductive subsurface body (in this case the slurry-filled mine working and conduit/breakthrough area) will radiate the signal from an inserted current electrode. Concentrations of current flow at the ground surface are expected to mimic the footprint of the conductive body.

In this case, mine workings containing electrically conductive slurry were energized by a current source electrode inserted through borehole DH1-11. A current sink electrode was placed on the far western shore of the impoundment – at a distance of over 1500 feet representing essentially electrical infinity. The approximate footprint of the slurry-filled mine workings, and the possible breakthrough zone were then delineated by mapping the current flow from the energized mine workings. Current flow was mapped as voltage using a pair of voltage electrodes (with a constant 20-foot spacing) attached to a high-impedance microvolt meter. The voltage electrodes were walked along linear profiles radiating from the current electrode borehole, with the voltage electrodes arranged collinearly with the borehole. For each measurement, the midpoint of the voltage electrodes was measured using a backpack-mounted Trimble Pathfinder global positioning system (GPS) receiver in contact with 6 to 8 position-fixing satellites. Real-time communication with OmniStar resulted in differential GPS (DGPS) positioning with an accuracy of plus or minus approximately two feet. The applied signal was generated by an Advanced GeoSciences Sting R1-IP earth resistivity meter. The voltage measurements were also collected and digitally recorded by the Sting R1-IP.

The field survey was conducted on the nights of December 19 and 20, 2000. Nighttime work was necessitated by the contemporary drilling efforts on the site. In order to minimize "leakage" of electrical current from the mine workings, drilling steel was removed from any active holes prior to commencement of the electrical survey, and readings were spread across two nights, to allow avoidance of the drill rigs themselves. Note that a drill rod is reportedly stuck in borehole DHX-2 (see Figure 1), but it extends no closer than approximately 10 feet to the top of the coal seam.

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The field voltages from the survey stations depicted in Figure 1 were subjected to removal of a geometric factor derived from standard equations for a gradient array (see e.g. Telford et al., 1990). The corrected voltages were contoured using the statistical kriging algorithm in SURFER by Golden Software, and are depicted in Figure 2. Note that Figures 1, 2 and 3 also depict a depression that was GPS-surveyed by Enviroscan in the field, and which the drillers reported was suffering active subsidence during the drilling operations.

The main feature of Figure 2 is a zone of high voltage that mimics the reported westward extent of mine workings near the surficial depression. This high voltage zone presumably mimics the footprint of a subsurface electrically conductive zone in contact with the electrode inserted through DH1-11. A portion of the mine workings containing slurry (or other wet and therefore electrically conductive earth materials) would produce such a zone. The footprint of this zone is shown in gray on Figure 3. Note that it presumably extends some distance eastward (beyond the geophysical survey data coverage).

Superimposed on the overall high voltage anomaly are two distinct peaks (and a third subtle peak). The footprints of the two main peaks are highlighted on Figure 3. These peaks should represent areas where a portion of the electrically conductive target extends closer to the ground surface – e.g. areas of current leakage from the electrified mine workings. Such current leakage would certainly occur through the breakthrough/conduit from the slurry impoundment, and could also occur along natural mineralized or oxidized near-vertical joints or fractures intersecting the mine workings. Note that none of the three anomaly peaks coincide with contemporary drilling operations or features, and are therefore interpreted as representing actual subsurface conditions rather than artifacts or interference.

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We have appreciated this opportunity to work with you. If you have any questions, please do not hesitate to contact me.

Sincerely,

Enviroscan, Inc.

Timothy D. Bechtel, Ph.D., P.G.

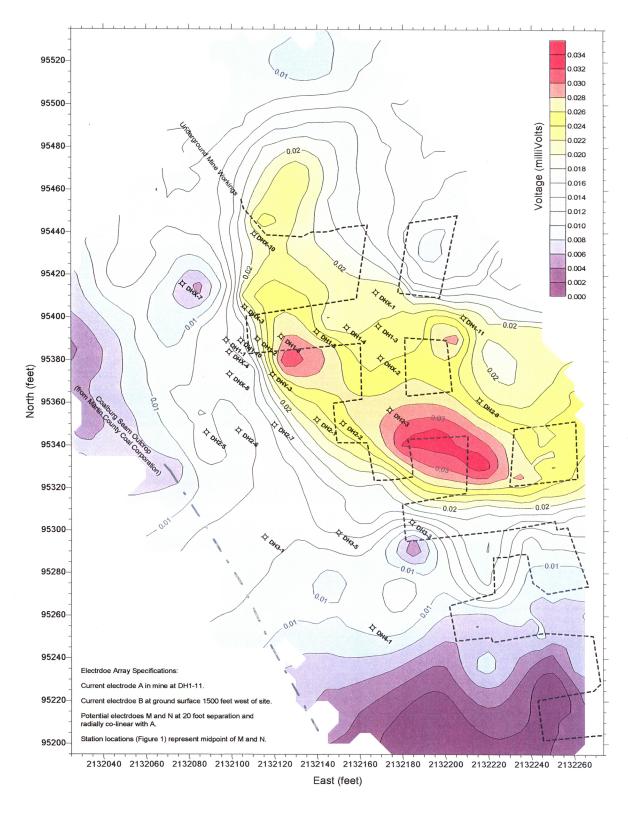
Principal Geophysicist

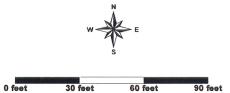
enc.: Figure 1: Geophysical Survey Data Coverage

Figure 2: Mise a la Masse Survey Data

Figure 3: Mise a la Masse Survey Interpretation Appendix A: Mise-a-la-Masse Method Schematic







Legend:

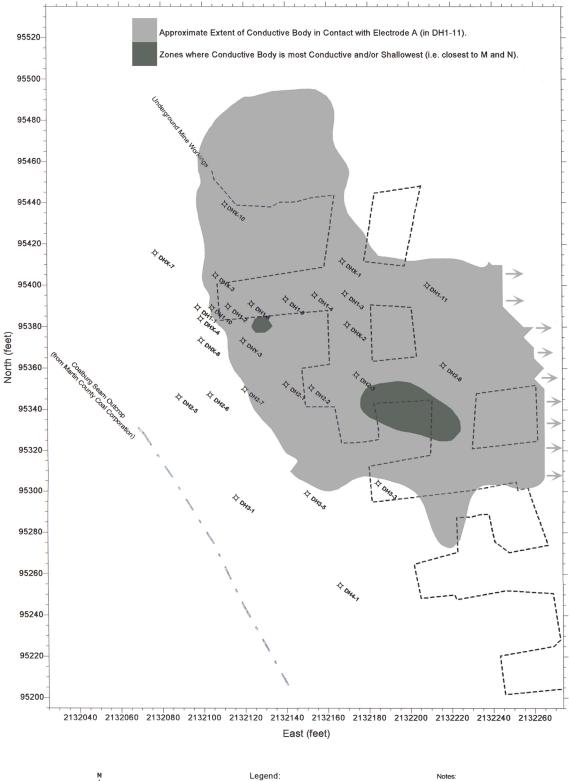
- + Mise a la Masse Survey Station
- → Drill Hole (by others)

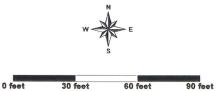
Notes:

Coordinates in KY North State Plane Grid, NAD-83 geodetic datum.

Survey stations and drill hole locations from DGPS survey by Enviroscan, Inc.

Mine plan and coal outcrop lines digitized from portions of "MSHA Drilling Program" map provided by MSHA.





- + Mise a la Masse Survey Station
- ♦ Drill Hole (by others)

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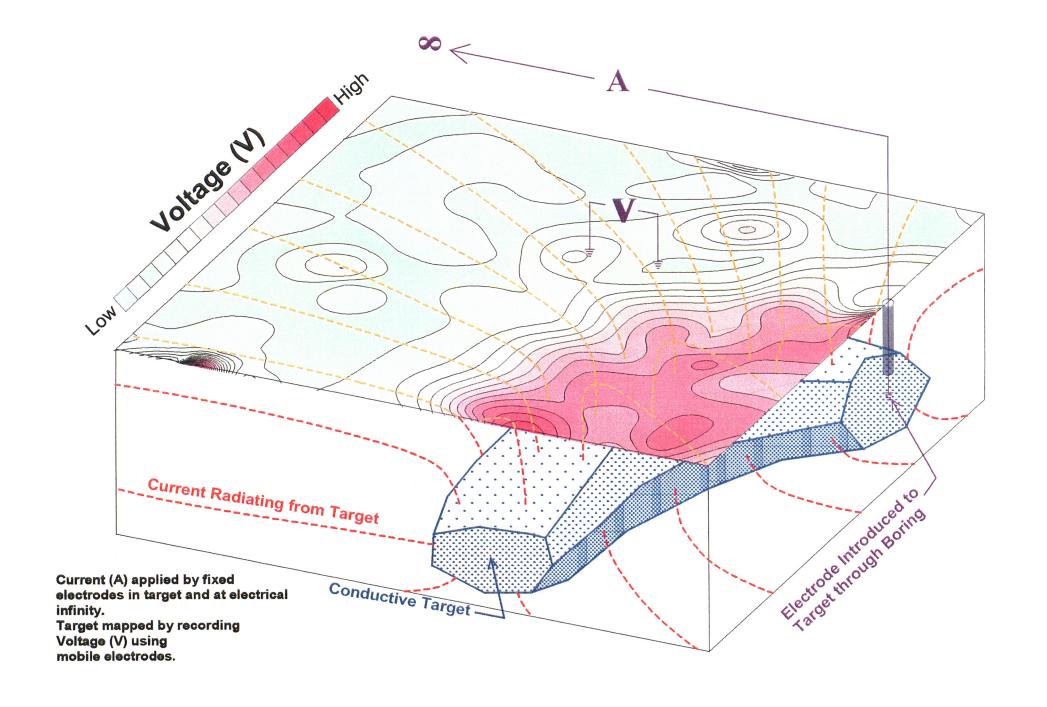
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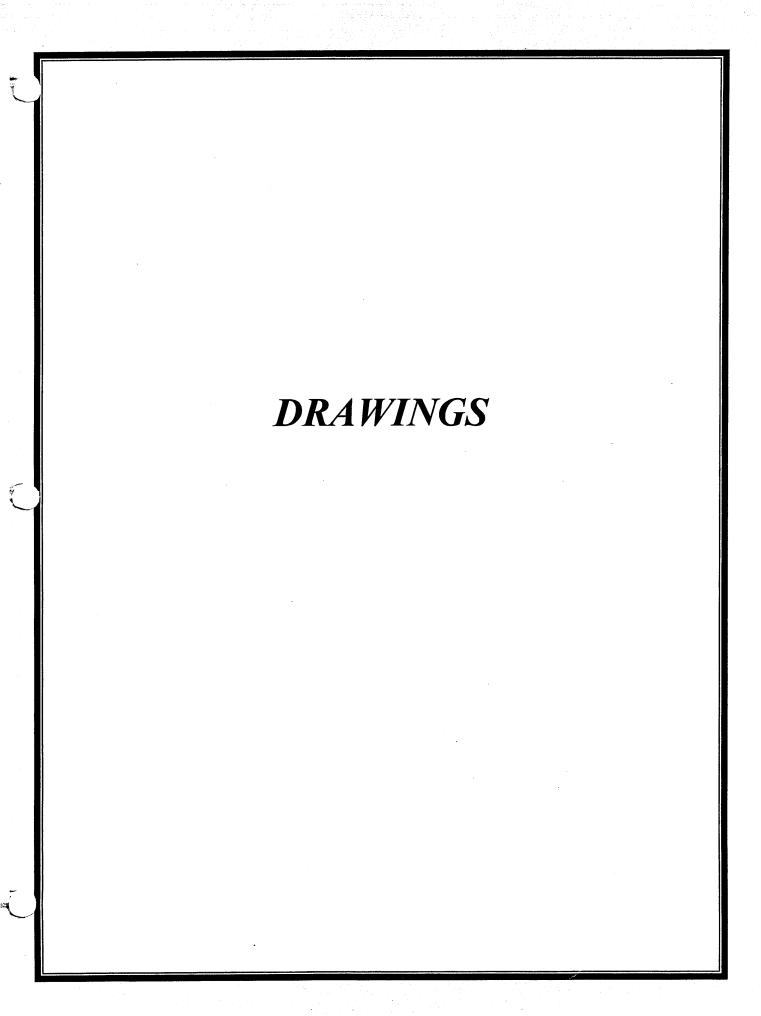
Appendix A

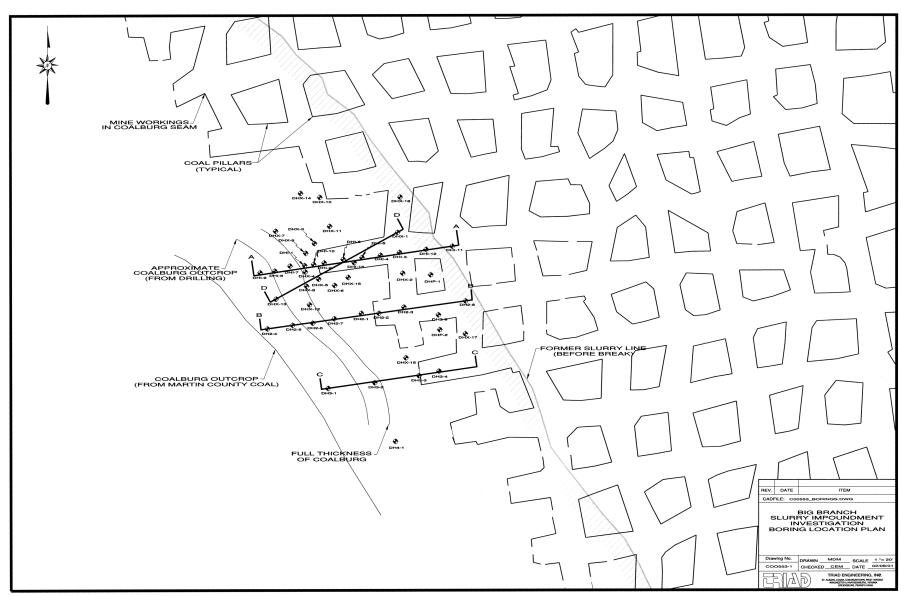
Mise-a-la-Masse Method Schematic

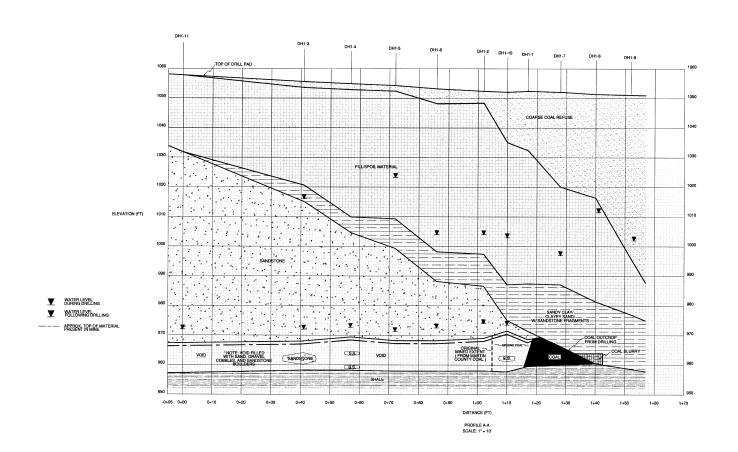


Mise a la Masse Method Schematic









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PROFILE A-A
BIG BRANCH
SLURRY IMPOUNDMENT INVESTIGATION
MARTIN COUNTY, KENTUCKY

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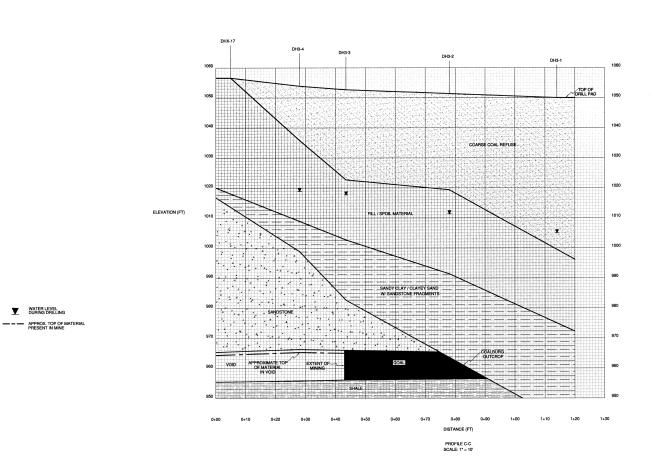
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PROFILE B-B
BIG BRANCH
SLURRY IMPOUNDMENT INVESTIGATION
MARTIN COUNTY, KENTUCKY

Drawing No. DRAWN MDM SCALE 1*-10*
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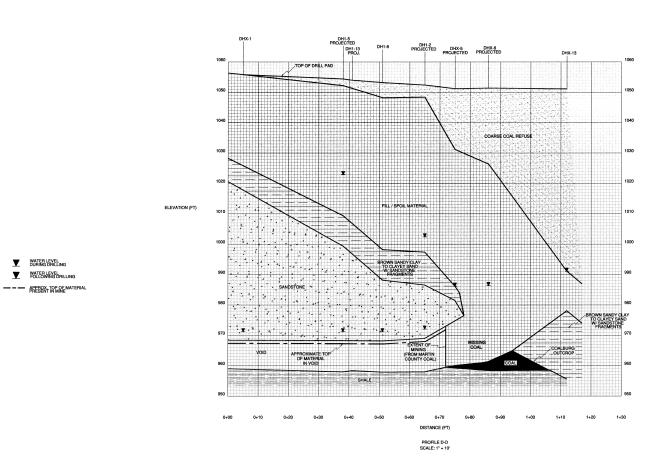
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CADFILE: C-C.DWG

PROFILE C-C
BIG BHANCH
SLURRY IMPOUNDMENT INVESTIGATION
MARTIN COUNTY, KENTUCKY

Drawing No. DRAWN MDM SCALE 1"-10"
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> C00553-5 CHECKED CEM DATE 02/01/01 TRIAD ENGINEERING, INC. ST. ALBANS, LOGAN, & MORGANTOWN, WEST VIRGINIA WINCHESTER & HAPPISCHBURG, VIRGINIA GREENGBURG, PENNSYLVANIA